



Modular I/O Configuration Guide

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Part I: Introduction to Modular I/O

Chapter 1: Introduction

The Avid Modular I/O system adds flexibility to configuring System 5 audio converters. Three frame types can be fitted with a variety of I/O modules to meet client requirements. Frame controller, Sync, MADI, Analog Mic/Line, AES/EBU, De-Embedder, and Dolby modules are available. The table below lists all modules in their categories.

Modular I/O System Components

Frame	Frame Controller	Sync	MADI	Analog Mic/Line	AES/EBU	De-embedder	Dolby
IO93 Double-Sided	FC972 Remote	SY983 Sync HD	MM935 MADI I/O (coax)	AD914 4ch Mic Input	DD915 8ch AES I/O 110 Ω	HD944 16ch De-embedder	DD901 Dolby D/E Decoder
IO94 Stagebox		WC984 4x Wordclock Out	MM936 MADI I/O (redundant fiber)	AD920 4ch Line In	DD916 8ch AES I/O 75 Ω		DD911 Dolby E Encoder
IO95 Multi-Zone				DA921 4ch Line Out			DD912 Dolby D/D+ Encoder
				AD922 4ch Line In			
				DA923 4ch Line Out			

This chapter includes overviews of each frame and how to choose a frame. See each frame's chapter for installation and other technical details.

Frame Specification

A Modular I/O configuration comprises modules selected to perform specific functions, and fitted to frames that accommodate their sync, control, and I/O requirements. Before choosing, installing, or servicing a Modular I/O frame, consider the following criteria.

Master Sync Source

Each frame must have a master audio sync source module for each *sync zone*, typically an SY983 Sync HD module. However, several other I/O modules with a *Master* mode can be used instead, but not in conjunction with an SY983.

IO93 Double-Sided and IO94 Stagebox frames consist of a single sync zone. The master sync source module must be positioned in one of four red sync source slots in the rear plane. The IO95 Multi-Zone frame contains five isolated sync zones. Each zone in use requires its own master sync source module.

⚠ To avoid damaging analog circuits, install a master sync source module in a red reserved slot before applying AC power.

Control Configuration

Each frame must be fitted with an FC972 Remote to externally configure all modules (except analog line in/out and WC984) and control mic preamps remotely using a web browser or console. Install only one FC972 per frame and up to two SY983s (for redundant operation, differentiated by Master/Slave setting).

Frame and Module Addresses

A Module's system ID consists of the Frame ID + module CAN ID. The Frame ID is determined by the FC972's IP Address/Subnet/Host Address. The FC972 must be assigned a unique IP Address based on the frame's role within the system. A CAN ID must be set for each externally controllable module. The AD914 Remote Mic Preamp has 16 CAN ID settings available, whereas most other modules have 32.

The FC972 and SY983 have default module CAN IDs that do not interfere with those of other modules. The internal CAN bus must be terminated once per frame, either on the FC972 or SY983.

Using the CAN Address switches on the FC972 or SY983 is an older method of setting the Frame ID. An explicit CAN Address must be set only when employing a hardware CAN-BUS remote controller to configure frames. In System 5, the Frame ID is set with the FC972's IP Address for configuration using a web browser interface. CAN Address switches on the FC972 and SY983 must be set to their non-active default values as described in their sections.

Frame Space

Frames have module slots in one or two *backplanes*. A module requires either one or two slots. Frames with two backplanes have a front and rear plane. Make sure there is enough physical space in the frame for the specified modules. Each frame's section in this guide lists the required space per frame.

Power

Each module is powered by the frame's +5 VDC rail. Power draw of the modules fitted in the frame must not exceed the frame's PSU capabilities. Power consumption for each module and power capability per frame is listed in each section of this guide.

Audio Busses

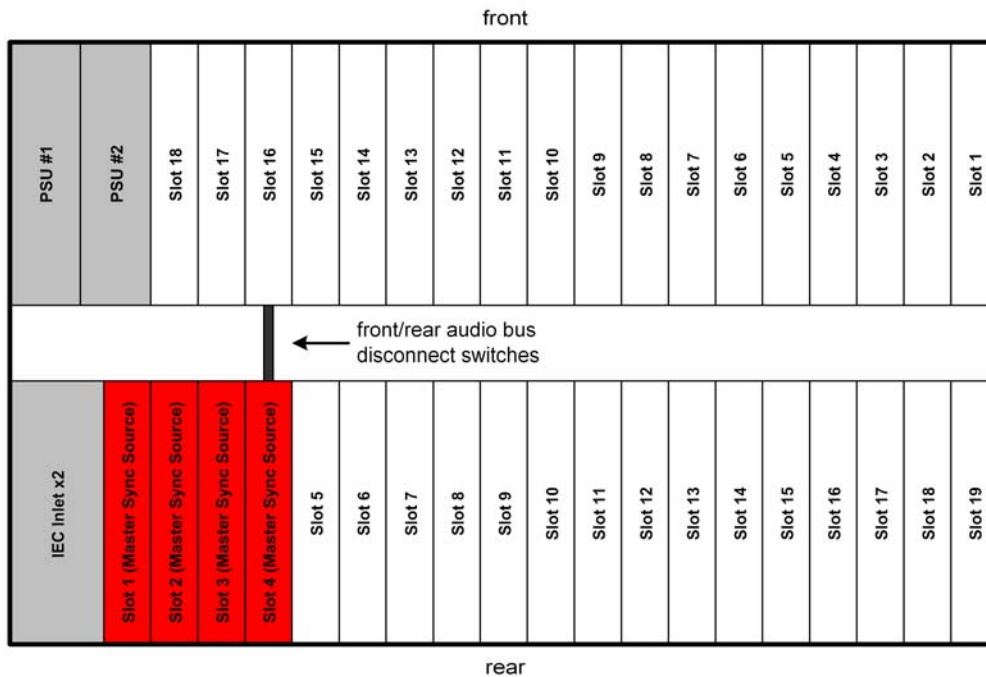
The Modular I/O backplanes are passive and all frame audio routing is set on the modules: *Source* audio is assigned to a bus routed to a number of *destinations*. Each Modular I/O backplane contains 32 audio busses (S1–S32).

All I/O modules provide a 2CH mode (two audio channels per bus). Many modules also feature an 8CH mode (eight audio channels per bus). Source and destination modules must be set to the same mode.

Some frames consist of multiple *audio zones* that decouple the audio busses between different frame sections. This supports higher signal densities per frame.

I093 Double-Sided Frame

The I093 Double-Sided Frame is a 3RU frame with redundant PSU and two backplanes. Master sync source module(s) must be installed in one (or two) of the four red slots in the rear plane near the power outlet before applying AC power. Spare red slots may be used for other modules.



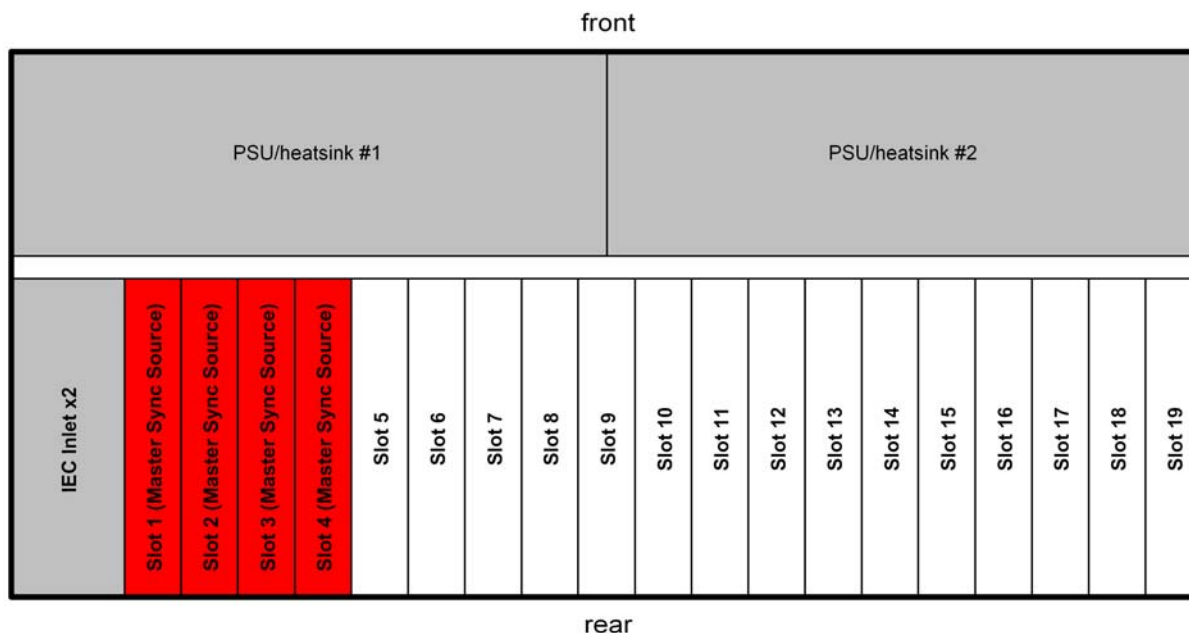
Top view of I093 frame layout with red slots reserved for Master sync source modules

I093 Frame Parameters

Master Sync Source	The I093 frame consists of one sync zone that requires one master sync source. This is typically an SY983 Sync HD module or two SY983s configured in redundant sync mode. Another I/O module with Master mode may be used as an alternate master sync source, <i>but not with an SY983</i> .
Control Configuration	Each I093 must be fitted with an FC972 Remote to control mic preamps remotely and externally configure all modules (except analog line in/out and WC984) remotely using a web browser. Install only one FC972 in a frame.
Frame Space	The I093 frame consists of a front plane with 18 module slots, and a rear plane with 19 module slots.
Power	The I093 frame contains dual-redundant PSUs: 13 A @ 5 VDC.
Audio Busses	Each of the two backplanes has 32 audio busses that can be linked or split between backplanes using internal DIP switches. Depending on the configuration of the modules fitted, each bus can function in 2CH or 8CH mode.

1094 Stagebox Frame

The IO94 Stagebox Frame is a 3RU frame with redundant PSU and a single backplane. It is ideally suited for stagebox applications and local I/O. Master sync source module(s) must be installed in one (or two) of the four red slots in the rear plane near the power outlet before applying AC power. Spare red slots may be used for other modules.



Top view of I094 Frame layout

1094 Frame Parameters

Master Sync Source	The I094 Frame consists of one sync zone and requires a single master sync source, typically an SY983 Sync HD module or two SY983s configured in redundant sync mode. Another I/O module with Master mode may be used as an alternate master sync source, <i>but not with an SY983</i> .
Control Configuration	The I094 Frame must be fitted with an FC972 Remote to control mic preamps remotely and configure externally controlled modules using a web browser. Install only one FC972 in the frame in any position.
Frame Space	The I094 Frame has one backplane with 19 module slots.
Power	The I094 frame contains dual-redundant PSUs: 20 A @ 5 VDC.
Audio Busses	The backplane has 32 audio busses each of which may be used in 2CH or 8CH mode, depending on the configuration of the frame's modules.

Redundant MADI-over-Fiber Configurations

The IO94 Frame's size and power are ideal for stagebox applications in which a MADI I/O module in Master mode serves as the master sync source. This lets the frame lock to incoming MADI without connecting a separate sync cable to the stagebox.

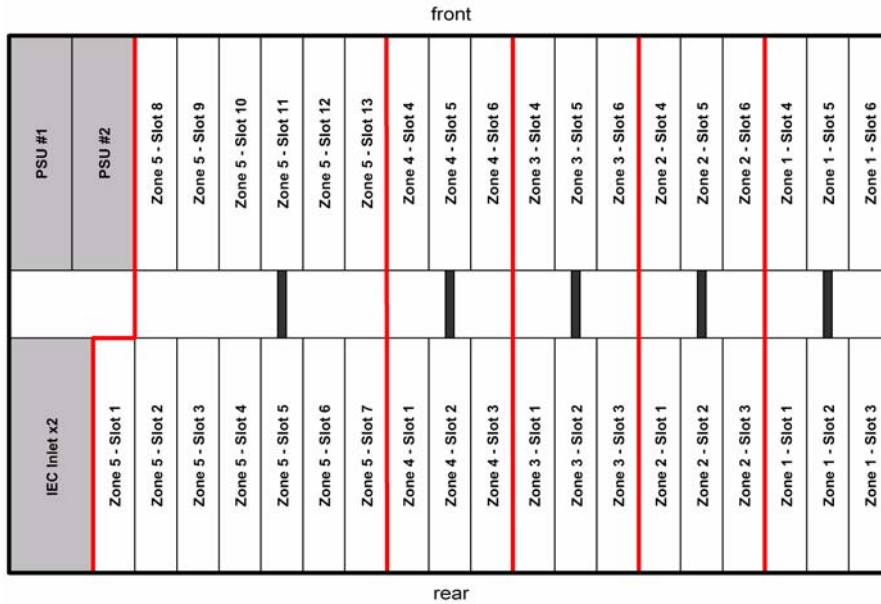
The MM935 MADI I/O (coaxial I/O) is useful for shorter distances. The MM936 MADI I/O (redundant multi-mode fiber) is useful for longer connections. The MM936 auto-switches between fibers if either fails. Multi-mode fiber can be easily converted to single-mode using third-party products, thus letting standard SMPTE camera cables connect to the stagebox.

 To use the MM936 MADI I/O (redundant fiber) in a stagebox, the redundant fiber must be converted to coaxial MADI to connect to the console. An MM936+MM935 may be fitted in a console-side frame to accomplish this conversion. Alternatively, if fiber auto-switching is not required, third-party MADI fiber-to-coaxial converters are available.

IO95 Multi-Zone Frame

The IO95 Multi-Zone is a 3RU frame with redundant PSU and two backplanes. The frame is divided into five discrete audio/sync zones. The IO95 accommodates applications that use multiple I/O streams, each referenced to a separate sync source.

For example, several Dolby-E encoder/decoders can be fitted into one IO95, each in its own audio/sync zone and referenced to separate sync sources. The audio is then fed into a central zone (using AES/EBU with SRC decoupling) where they are routed into a single MADI stream.



Top view of IO95 frame layout with red lines designating separate audio/sync zones

IO95 Frame Parameters

Master Sync Source	The IO95 frame consists of five discrete sync zones. Each zone in use requires its own master sync source, typically an SY983 Sync HD module or two SY983s configured in redundant sync mode. Another I/O module with Master mode may serve as a master sync source, <i>but not with an SY983 in the same zone</i> . Master sync source module(s) can be installed in any slot in a zone.
Control Configuration	The IO95 frame must be fitted with an FC972 Remote to remotely control mic preamps and configure externally controlled modules using a web browser. One FC972 may be fitted in any position within the frame.
Frame Space	The IO95 frame has two backplanes, each divided into five audio/sync zones. Four zones contain six slots and one zone contains 13 slots.
Power	The IO95 frame contains dual-redundant PSUs: 13 A @ 5 VDC.
Audio Busses	The IO95 Frame contains five discrete audio/sync zones, each with 32 audio busses. Each bus can be in 2CH or 8CH mode depending on the configuration of the modules fitted.

Frame and Module Summaries

Modular I/O Frame Summary

Model	Type	Sync	Backplane Space	Power at 5 VDC	Audio Busses
IO93	Double-Sided	Single sync zone	Rear: 19 slots Front: 18 slots	13 A	Rear: 32 busses Front: 32 busses linked or discrete
IO94	Stagebox	Single sync zone	19 slots	20 A	32 audio busses
IO95	Multi-Zone	Five discrete audio/ sync zones	Zones 1–4: 6 slots Zone 5: 13 slots	13 A	5 discrete audio/sync zones 32 busses each

Modular I/O Module Summary

Model	Type	Connectors	Slots	Web Browser Configuration	Power at 5 VDC	Audio Bus Modes
FC972	Remote	RJ45, 9-pin D-Sub	1	Yes	300 mA	—
SY983	Sync HD	BNC x2 (sync in, WC out)	1	Yes	300 mA	—
WC984	4x Wordclock	BNC x4	1	No	100 mA	—
MM935	MADI I/O (coax)	BNC x2	1	Yes	360 mA	2CH/8CH
MM936	MADI I/O (redundant fiber)	SC x4	1	Yes	360 mA	2CH/8CH
AD914	4ch Mic In	RJ45 x4	1	Yes	1.3 A	2CH
AD920	4ch Line In	XLR x4	2	No	850 mA	2CH
DA921	4ch Line Out	XLR x4	2	No	650 mA	2CH
AD922	4ch Line In	15-pin D-Sub	1	No	850 mA	2CH
AD923	4ch Line Out	15-pin D-Sub	1	No	650 mA	2CH
DD915	8ch AES I/O	15-pin D-Sub	1	Yes	1 A	2CH/8CH
DD916	8ch AES I/O	BNC x8	2	Yes	1 A	2CH/8CH
HD944	16ch HD/SD De-embedder	BNC x2, (in, thru)	1	Yes	600 mA	2CH/8CH
DE901	Dolby D/E Decoder	BNC, 9-pin D-Sub	1	Yes	500 mA	2CH/8CH
DE911	Dolby E Encoder	BNC, 9-pin D-Sub	1	Yes	600 mA	2CH/8CH
DE912	Dolby D/D+ Encoder	BNC, 9-pin D-Sub	1	Yes	600 mA	2CH/8CH

Chapter 2: Typical Frame Configurations

This chapter describes three typical frame configurations:

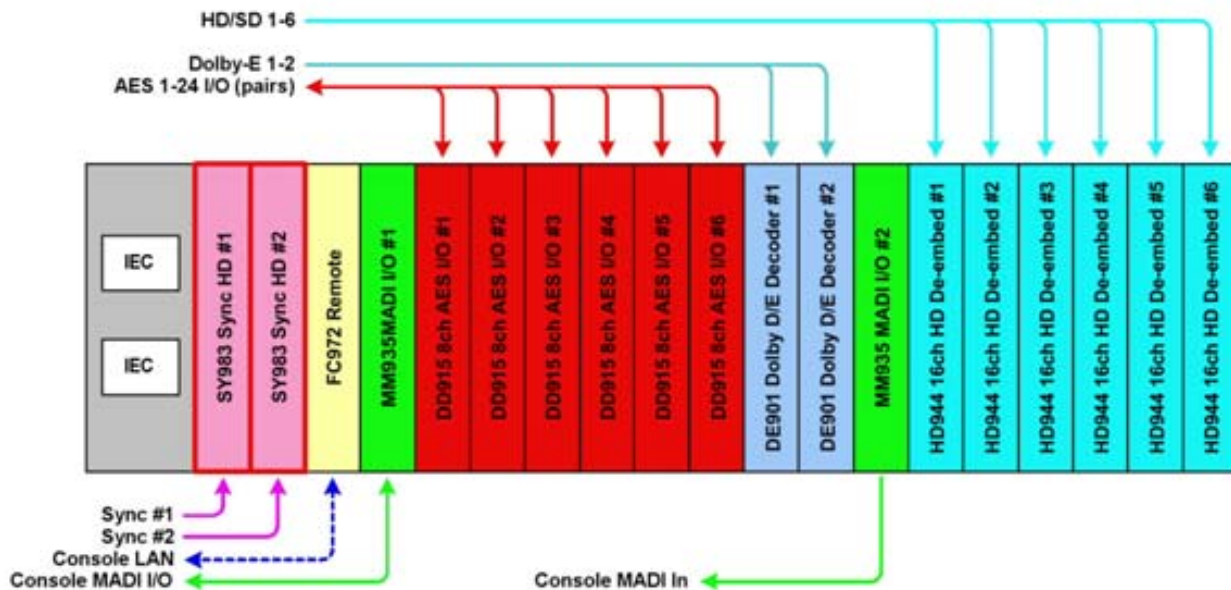
- Digital I/O in IO94 Frame with redundant fiber connection
- Stagebox I/O in IO94 Frame with console-side IO93 Frame with two redundant fiber interfaces
- IO95 Multi-Zone Frame with discrete sync with Dolby® E Encoder

These are useful examples to consult as you consider your own system configuration.

Digital I/O in IO94 Frame

Features

- IO94 Single-sided Frame
- Redundant Sync operation
- 24 AES/EBU I/O 110 Ω pairs (48 audio channels I/O)
- Two Dolby E Decoders (eight audio channels each)
- Six HD/SD 16-channel De-embedders (configured as eight audio channels each)
- Two MADI console connections



IO94 Frame with SY983 master sync source modules outlined in red

Synchronization

To configure the frame for synchronization:

- 1 To avoid damaging analog circuitry, make sure the AC power is off before beginning the installation.
- 2 Install SY983 Sync HD #1 in a red reserved slot and set as Master.
- 3 Install SY983 Sync HD #2 in a red reserved slot and set as Slave.

Control

To configure remote control, use the FC972 Remote to set the following parameters:

- 1 Set the IP Address range to 192.168.0.157~159/255.255.255.0
- 2 Set the Gateway to 192.168.0.1 This gateway permits configuration by the console system computer.

 See “FC972 Remote” on page 49 for details.

 This frame does not require console control for mic preamps. Therefore, IP Address range 192.168.0.150~156 is skipped.

Module CAN IDs

Set the CAN ID of each module to match the table below.

 See each module’s section in Part III to learn how to set its CAN ID.

IO94 Frame

Module	CAN ID
MM935 #1	0
MM935 #2	1
DD915 #1	2
DD915 #2	3
DD915 #3	4
DD915 #4	5
DD915 #5	6
DD915 #6	7
DE901 #1	8
DE901 #2	9
HD944 #1	10
HD944 #2	11
HD944 #3	12
HD944 #4	13
HD944 #5	14
HD944 #6	15

Power

The IO94 Frame has a maximum power capacity of 20 A @ 5 VDC. Each module's power consumption and total power are listed in the table below.

IO94 Frame Power Consumption

Module	Quantity	Power (A)	Subtotal (A)
SY983	2	.30	.60
FC972	1	.30	.30
MM935	2	.36	.72
DD915	6	1.00	6.00
DE901	2	.50	1.00
HD944	6	.60	3.60
		Total (A):	12.22

Audio Routing

The table below shows all module routing for the IO94 Frame with Digital I/O configuration.

To connect the IO94 to the console, make the following MADI connections:

- 1** Connect MM935 #1 MADI Out to Console MADI In.
- 2** Connect MM936 #2 MADI Out to Console MADI In.
- 3** Connect Console MADI Out to MM935 #1 MADI In.

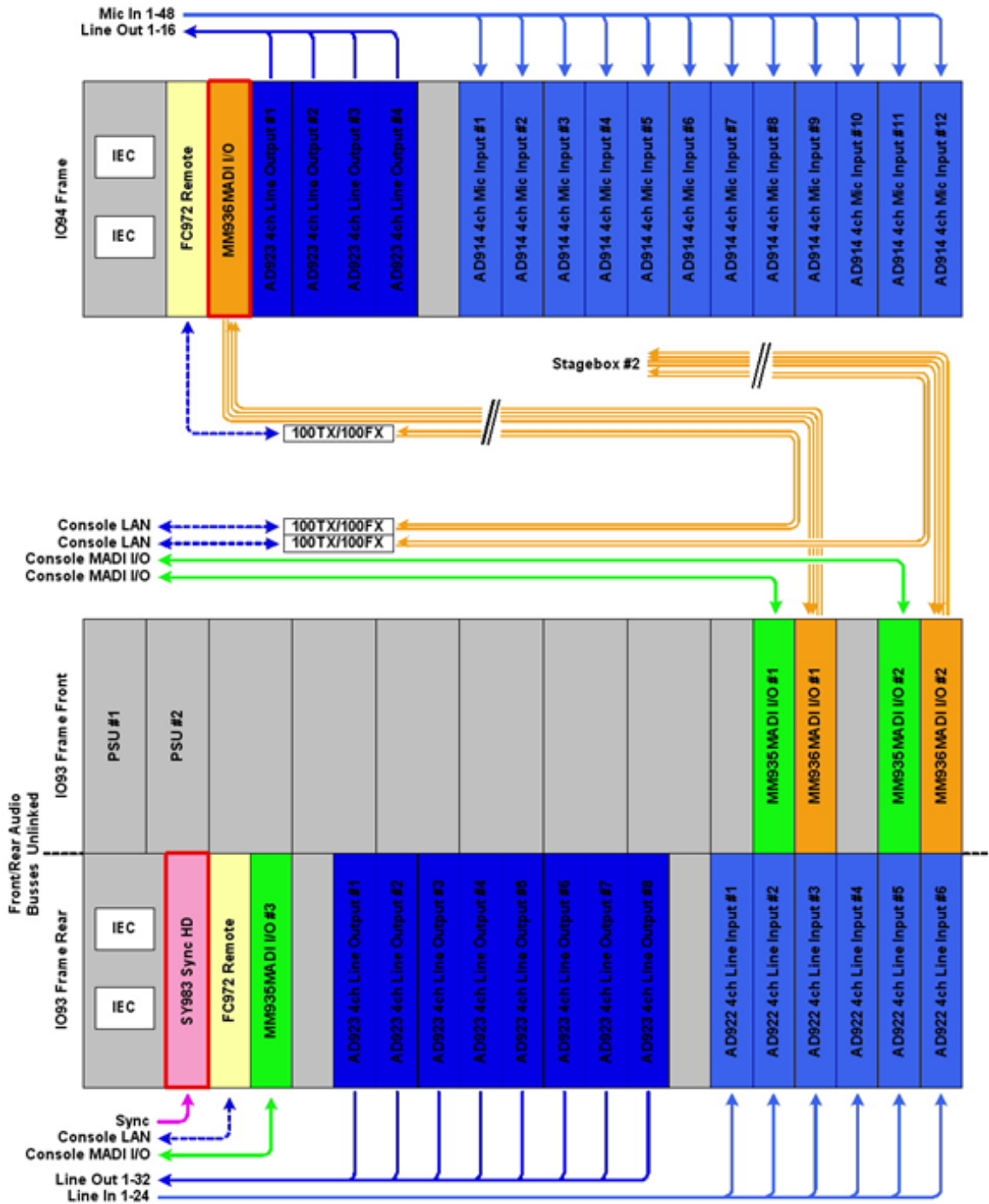
Module Audio Routing

Source			Audio Bus		Destination		
Module	Signal	Channels	Bus	Mode	Module	Signal	Channels
DD915 #1	AES In	1–8	S1	8ch	MM935 #1	MADI Out	1–8
DD915 #2	AES In	1–8	S2	8ch	MM935 #1	MADI Out	9–16
DD915 #3	AES In	1–8	S3	8ch	MM935 #1	MADI Out	17–24
DD915 #4	AES In	1–8	S4	8ch	MM935 #1	MADI Out	25–32
DD915 #5	AES In	1–8	S5	8ch	MM935 #1	MADI Out	33–40
DD915 #6	AES In	1–8	S6	8ch	MM935 #1	MADI Out	41–48
DE901 #1	Dolby E In	1–8	S7	8ch	MM935 #1	MADI Out	49–56
DE901 #1	Dolby E In	1–8	S8	8ch	MM935 #1	MADI Out	57–64
HD944 #1	HD/SD In	1–8	S9	8ch	MM935 #2	MADI Out	1–8
HD944 #2	HD/SD In	1–8	S10	8ch	MM935 #2	MADI Out	9–16
HD944 #3	HD/SD In	1–8	S11	8ch	MM935 #2	MADI Out	17–24
HD944 #4	HD/SD In	1–8	S12	8ch	MM935 #2	MADI Out	25–32
HD944 #5	HD/SD In	1–8	S13	8ch	MM935 #2	MADI Out	33–40
HD944 #6	HD/SD In	1–8	S14	8ch	MM935 #2	MADI Out	41–48
MM935 #1	MADI In	1–8	S32	8ch	DD915 #1	AES Out	1–8
MM935 #1	MADI In	9–16	S31	8ch	DD915 #2	AES Out	1–8
MM935 #1	MADI In	17–24	S30	8ch	DD915 #3	AES Out	1–8
MM935 #1	MADI In	25–32	S29	8ch	DD915 #4	AES Out	1–8
MM935 #1	MADI In	33–40	S28	8ch	DD915 #5	AES Out	1–8
MM935 #1	MADI In	41–48	S27	8ch	DD915 #6	AES Out	1–8

Remote Stageboxes with Redundant Fiber Connection

Features

- Remote IO94 Stagebox with 48 mic inputs and 16 line outputs
- Redundant MADI-over-fiber audio connection
- Console-side IO93 Frame with two redundant fiber interfaces
- Console-side IO93 Frame local I/O with 24 line inputs and 32 line outputs



Red outline shows master sync source modules for IO94 (MM936) and IO93 (SY983)

Synchronization

To configure each frame for synchronization:

- 1 To avoid damaging analog circuitry, make sure the AC power is off before beginning the installation.
- 2 Install the MM936 MADI in a reserved slot in the IO94 Frame and set it as Master.
- 3 Install the SY983 in a reserved slot in the IO93 Frame and set it as Master.

Control

To set up remote control for the IO94 and IO93 Frames:

- 1 Set the FC972 Remote to IP Address range:
IO94: 192.168.0.150~156/255.255.255.0
IO93: 192.168.0.157~159/255.255.255.0
(192.168.0.150~156 skipped because this frame does not contain mic preamps.)
- 2 Set the Gateway for both frames to 192.168.0.1 for configuration by console system computer.

Module CAN IDs

Set the CAN ID of each module to match the table below.

 See each module's section in Part III to learn how to set its CAN ID.

IO94 Stagebox

Module	CAN ID
AD914 #1	0
AD914 #2	1
AD914 #3	2
AD914 #4	3
AD914 #5	4
AD914 #6	5
AD914 #7	6
AD914 #8	7
AD914 #9	8
AD914 #10	9
AD914 #11	10
AD914 #12	11
MM936	12

IO93 Frame

Module	CAN ID
MM935 #1	0
MM935 #2	1
MM935 #3	2
MM936 #1	3
MM936 #2	4

Power

The IO94 Stagebox has a maximum power capacity of 20 A @ 5 VDC.

The IO93 Frame has a maximum power capacity of 13 A @ 5 VDC.

Individual module and total frame power consumption are summarized in the tables below.

IO94 Stagebox Module Power Consumption

Module	Quantity	Power (A)	Subtotal (A)
FC972	1	.30	.30
MM935	1	.36	.36
AD914	12	1.30	15.60
DA923	4	.65	2.60
		Total (A):	18.86

IO93 Frame Module Power Consumption

Module	Quantity	Power (A)	Subtotal (A)
SY983	1	.30	.30
FC972	1	.30	.30
MM935	3	.36	1.08
MM936	2	.36	.72
DA922	6	.85	5.10
DA923	8	.65	5.20
		Total (A):	12.70

Audio Routing

All audio routing between modules for the IO94 and IO93 Frames is shown in the two tables that follow.

Follow the steps below to make Frame-to-Frame and Frame-to-console connections.

To connect the modules in Stagebox #1:

- 1 Connect IO94 Stagebox #1 MM936 MADI Out to IO93 Frame MM936 #1 MADI In (fiber).
- 2 Connect IO93 Frame MM936 #1 MADI Out to IO94 Stagebox #1 MM936 MADI In (fiber).
- 3 Connect Console MADI Out to MM935 #1 MADI In.
- 4 Connect IO93 MM935 #1 MADI Out to Console MADI In.

To connect the modules in Stagebox #2:

- 1 Connect IO94 Stagebox #2 MM936 MADI Out to IO93 Frame MM936 #2 MADI In (fiber).
- 2 Connect IO93 Frame MM936 #2 MADI Out to IO94 Stagebox #2 MM936 MADI In (fiber).
- 3 Connect IO93 MM935 #2 MADI Out to Console MADI In.
- 4 Connect Console MADI Out to MM935 #2 MADI In.

To make Local I/O connections:

- 1 Connect IO93 MM935 #3 MADI Out to Console MADI In.
- 2 Connect Console MADI Out to MM935 #3 MADI In.

I094 Stagebox Module Audio Routing

Since Stagebox #2 is the same as Stagebox #1, only Stagebox #1 routing is shown.

I094 Frame Module Audio Routing: Stagebox Fiber Interface Routing

Source			Audio Bus		Destination		
Module	Signal	Channels	Bus	Mode	Module	Signal	Channels
AD914 #1	Mic In	1/2	S1	2ch	MM936	MADI Out	1/2
AD914 #1	Mic In	3/4	S2	2ch	MM936	MADI Out	3/4
AD914 #2	Mic In	1/2	S3	2ch	MM936	MADI Out	5/6
AD914 #2	Mic In	3/4	S4	2ch	MM936	MADI Out	7/8
AD914 #3	Mic In	1/2	S5	2ch	MM936	MADI Out	9/10
AD914 #3	Mic In	3/4	S6	2ch	MM936	MADI Out	11/12
AD914 #4	Mic In	1/2	S7	2ch	MM936	MADI Out	13/14
AD914 #4	Mic In	3/4	S8	2ch	MM936	MADI Out	15/16
AD914 #5	Mic In	1/2	S9	2ch	MM936	MADI Out	17/18
AD914 #5	Mic In	3/4	S10	2ch	MM936	MADI Out	19/20
AD914 #6	Mic In	1/2	S11	2ch	MM936	MADI Out	21/22
AD914 #6	Mic In	3/4	S12	2ch	MM936	MADI Out	23/24
AD914 #7	Mic In	1/2	S13	2ch	MM936	MADI Out	25/26
AD914 #7	Mic In	3/4	S14	2ch	MM936	MADI Out	27/28
AD914 #8	Mic In	1/2	S15	2ch	MM936	MADI Out	29/30
AD914 #8	Mic In	3/4	S16	2ch	MM936	MADI Out	31/32
AD914 #9	Mic In	1/2	S17	2ch	MM936	MADI Out	33/34
AD914 #9	Mic In	3/4	S18	2ch	MM936	MADI Out	35/36
AD914 #10	Mic In	1/2	S19	2ch	MM936	MADI Out	37/38
AD914 #10	Mic In	3/4	S20	2ch	MM936	MADI Out	39/40
AD914 #11	Mic In	1/2	S21	2ch	MM936	MADI Out	41/42
AD914 #11	Mic In	3/4	S22	2ch	MM936	MADI Out	32/44
AD914 #12	Mic In	1/2	S23	2ch	MM936	MADI Out	45/46
AD914 #12	Mic In	3/4	S24	2ch	MM936	MADI Out	47/48
MM936	MADI In	1/2	S32	2ch	DA923 #1	Line Out	1/2
MM936	MADI In	3/4	S31	2ch	DA923 #1	Line Out	3/4
MM936	MADI In	5/6	S30	2ch	DA923 #2	Line Out	1/2
MM936	MADI In	7/8	S29	2ch	DA923 #2	Line Out	3/4
MM936	MADI In	9/10	S28	2ch	DA923 #3	Line Out	1/2
MM936	MADI In	11/12	S27	2ch	DA923 #3	Line Out	3/4
MM936	MADI In	13/14	S26	2ch	DA923 #4	Line Out	1/2
MM936	MADI In	15/16	S25	2ch	DA923 #4	Line Out	3/4

I093 Frame Module Audio Routing

I093 Audio Routing: Stagebox Fiber Interface Routing

Source			Audio Bus			Destination		
Module	Signal	Channels	Side	Bus	Mode	Module	Signal	Channels
MM936 #1	MADI In	1–8	front	S1	8ch	MM935 #1	MADI Out	1–8
MM936 #1	MADI In	9–16	front	S2	8ch	MM935 #1	MADI Out	9–16
MM936 #1	MADI In	17–24	front	S3	8ch	MM936 #1	MADI Out	17–24
MM936 #1	MADI In	25–32	front	S4	8ch	MM936 #1	MADI Out	25–32
MM936 #1	MADI In	33–40	front	S5	8ch	MM936 #1	MADI Out	33–40
MM936 #1	MADI In	41–48	front	S6	8ch	MM936 #1	MADI Out	41–48
MM935 #1	MADI In	1–8	front	S32	8ch	MM936 #1	MADI Out	1–8
MM935 #1	MADI In	9–16	front	S31	8ch	MM936 #1	MADI Out	9–16
MM936 #2	MADI In	1–8	front	S7	8ch	MM935 #2	MADI Out	1–8
MM936 #2	MADI In	9–16	front	S8	8ch	MM935 #2	MADI Out	9–16
MM936 #2	MADI In	17–24	front	S9	8ch	MM936 #2	MADI Out	17–24
MM936 #2	MADI In	25–32	front	S10	8ch	MM936 #2	MADI Out	25–32
MM936 #2	MADI In	33–40	front	S11	8ch	MM936 #2	MADI Out	33–40
MM936 #2	MADI In	41–48	front	S12	8ch	MM936 #2	MADI Out	41–48
MM935 #2	MADI In	1–8	front	S30	8ch	MM936 #2	MADI Out	1–8
MM935 #2	MADI In	9–16	front	S29	8ch	MM936 #2	MADI Out	9–16
AD922 #1	Line In	1/2	back	S1	2ch	MM936	MADI Out	1/2
AD922 #1	Line In	3/4	back	S2	2ch	MM936	MADI Out	3/4
AD922 #2	Line In	1/2	back	S3	2ch	MM936	MADI Out	5/6
AD922 #2	Line In	3/4	back	S4	2ch	MM936	MADI Out	7/8
AD922 #3	Line In	1/2	back	S5	2ch	MM936	MADI Out	9/10
AD922 #3	Line In	3/4	back	S6	2ch	MM936	MADI Out	11/12
AD922 #4	Line In	1/2	back	S7	2ch	MM936	MADI Out	13/14
AD922 #4	Line In	3/4	back	S8	2ch	MM936	MADI Out	15/16
AD922 #5	Line In	1/2	back	S9	2ch	MM936	MADI Out	17/18
AD922 #5	Line In	3/4	back	S10	2ch	MM936	MADI Out	19/20
AD922 #6	Line In	1/2	back	S11	2ch	MM936	MADI Out	21/22
AD922 #6	Line In	3/4	back	S12	2ch	MM936	MADI Out	23/24
MM935 #3	MADI In	1/2	back	S32	2ch	DA923 #1	Line Out	1/2
MM935 #3	MADI In	3/4	back	S31	2ch	DA923 #1	Line Out	3/4
MM935 #3	MADI In	5/6	back	S30	2ch	DA923 #2	Line Out	1/2
MM935 #3	MADI In	7/8	back	S29	2ch	DA923 #2	Line Out	3/4
MM935 #3	MADI In	9/10	back	S28	2ch	DA923 #3	Line Out	1/2
MM935 #3	MADI In	11/12	back	S27	2ch	DA923 #3	Line Out	3/4

IO93 Audio Routing: Stagebox Fiber Interface Routing

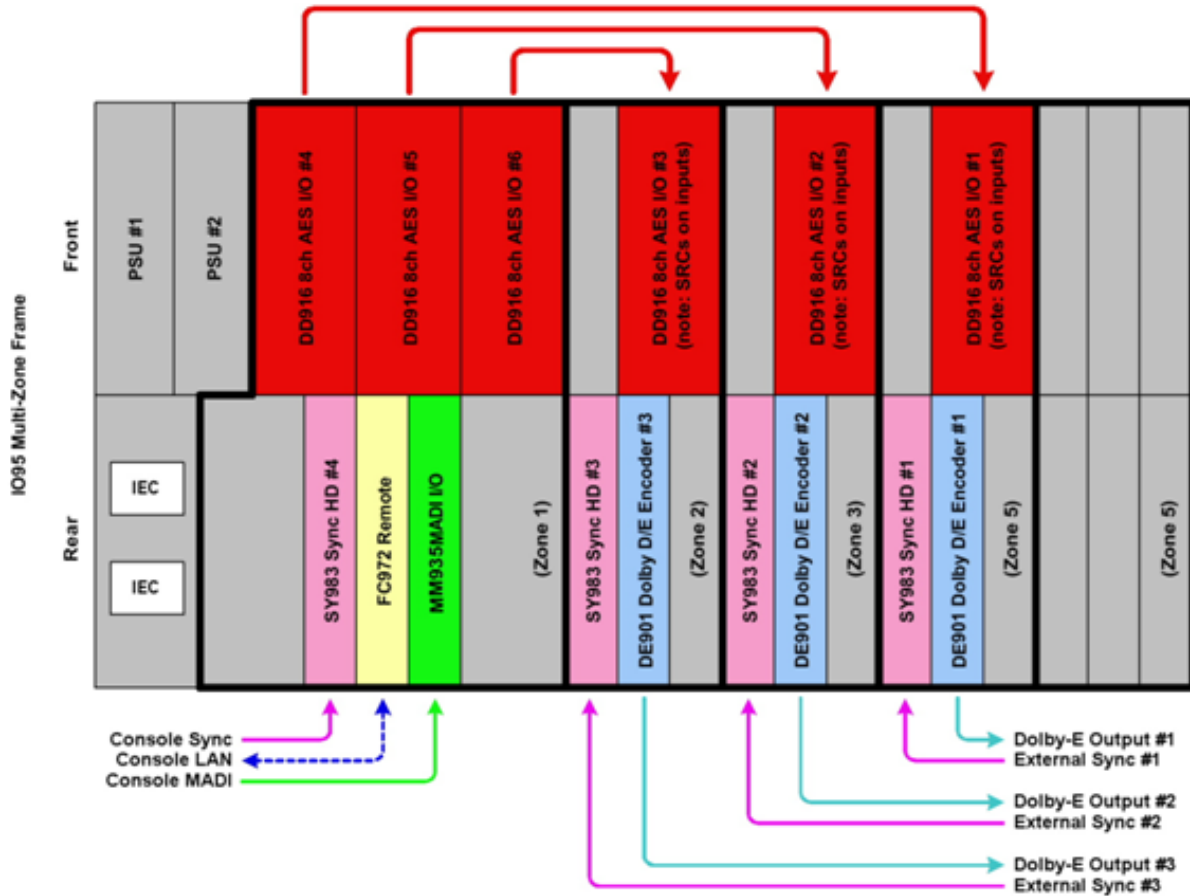
MM935 #3	MADI In	13/14	back	S26	2ch	DA923 #4	Line Out	1/2
MM935 #3	MADI In	15/16	back	S25	2ch	DA923 #4	Line Out	3/4
MM935 #3	MADI In	17/18	back	S24	2ch	DA923 #5	Line Out	1/2
MM935 #3	MADI In	19/20	back	S23	2ch	DA923 #5	Line Out	3/4
MM935 #3	MADI In	21/22	back	S22	2ch	DA923 #6	Line Out	1/2
MM935 #3	MADI In	23/24	back	S21	2ch	DA923 #6	Line Out	3/4
MM935 #3	MADI In	25/26	back	S20	2ch	DA923 #7	Line Out	1/2
MM935 #3	MADI In	27/28	back	S19	2ch	DA923 #7	Line Out	3/4
MM935 #3	MADI In	29/30	back	S18	2ch	DA923 #8	Line Out	1/2
MM935 #3	MADI In	31/32	back	S17	2ch	DA923 #8	Line Out	3/4

Dolby E Encoder with Discrete Sync in IO95 Multi-zone Frame

In most cases, Dolby E Encoders may be integrated into any standard frame configuration. However, the Dolby E stream sometimes uses external sync that is asynchronous with the console sync. Each Dolby E Encoder must then be paired with its own sync module isolated from console sync. Audio signals feeding the Dolby E encoders must also be decoupled from console sync.

The IO95 Multi-zone Frame has five zones, each with its own discrete sync and audio busses. This supports fitting multiple Dolby E modules into a single frame and referencing them to different sync sources. The frame shares a common control bus so only one FC972 Remote is required to configure all installed modules.

💡 *The IO95 has no reserved slots for sync modules. One master sync source module must be installed in each active zone.*



IO95 Multi-zone Frame: Black outline shows discrete sync/audio bus zones

Synchronization

To configure the IO95 for synchronization:

- 1 To avoid damaging analog circuitry, make sure the AC power is off before beginning the installation.
- 2 Install an SY983 Sync HD in Zones 1–4 and set each as Master.
Since there are no modules in Zone 5, an SY983 is not necessary.

Control

To set up remote control for the IO95 Frame, use the FC972 Remote to configure the following parameters:

- 1 Set the IP Address range to 192.168.0.157~159/255.255.255.0.
- 2 Set the Gateway to 192.168.0.1 for configuration by console system computer.

 See “FC972 Remote” on page 49 for details.

 This frame does not contain mic preamps so IP Address range 192.168.0.150~156 is skipped.

Module CAN IDs

Set the CAN ID of each module to match the table below.

 See each module's section in Part III to learn how to set its CAN ID.

IO95 Multi-zone Frame

Module	CAN ID
MM935	0
DE911 #1	1
DE911 #2	2
DE911 #3	3
DD916 #1	4
DD916 #2	5
DD916 #3	6
DD916 #4	7
DD916 #5	8
DD916 #6	9

Power

The IO95 Multi-zone Frame has a maximum power capacity of 13 A @ 5 VDC. Individual module and the IO95's total power consumption are summarized in the table below.

IO95 Multi-zone Frame Module Power Consumption

Module	Quantity	Power (A)	Subtotal (A)
SY983	4	.30	1.20
FC972	1	.30	.30
MM935	1	.36	.36
DD915	6	1.00	6.00
DE911	3	.60	1.80
		Total (A):	9.66

MADI Routing

The table below shows all module routing for this configuration.

To connect to the console, make the following console-to-IO95 Frame connections:

- 1 Connect Console MADI Out to IO95 MM935 #1 MADI In
- 2 Connect IO95 MM935 #1 MADI Out to Console MADI In

IO95 MADI Connections

Source			Audio Bus			Destination		
Module	Signal	Channels	Zone	Bus	Mode	Module	Signal	Channels
MM935	MADI In	1–8	1	S32	8ch	DD916 #4	AES Out	1–8
MM935	MADI In	9–16	1	S31	8ch	DD916 #5	AES Out	1–8
MM935	MADI In	17–24	1	S30	8ch	DD916 #6	AES Out	1–8
DD916 #1	AES Out	1–8	2	S1	8ch	DE911 #1	MADI Out	9/10
DD916 #2	AES Out	1–8	3	S1	8ch	DE911 #2	MADI Out	11/12
DD916 #3	AES Out	1–8	4	S1	8ch	DE911 #3	MADI Out	13/14

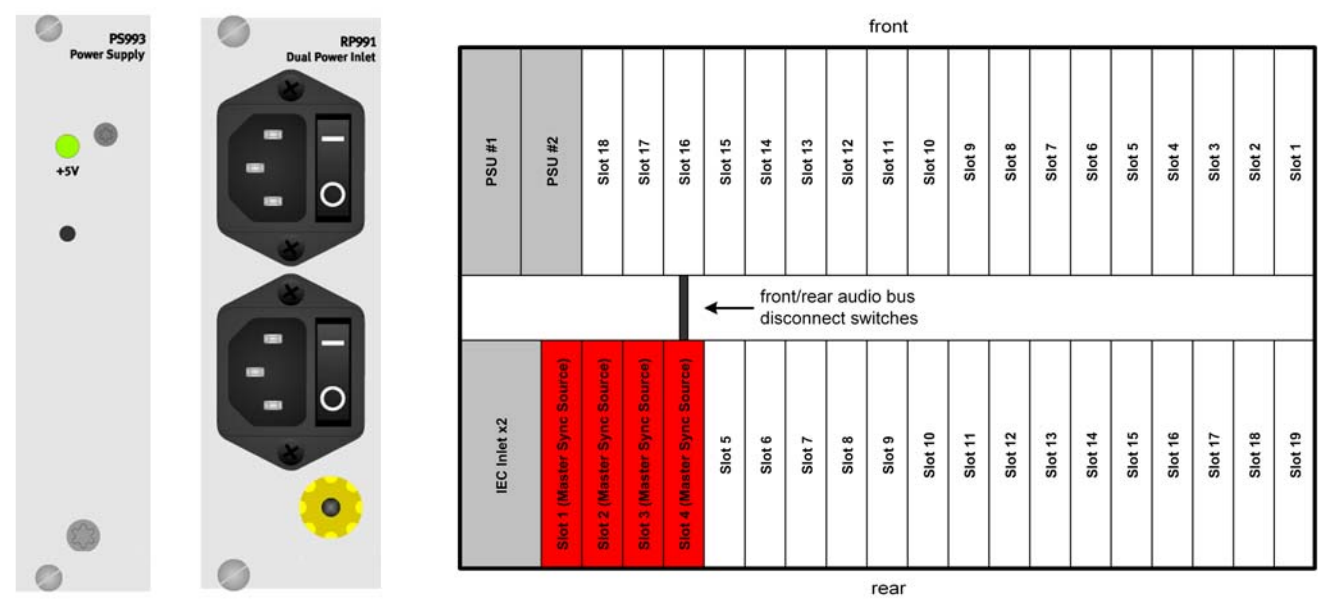
Part II: Frames

Chapter 3: IO93 Modular Frame

The IO93 is housed in a 3-RU, RF-shielded, 19-inch modular chassis.

Features

- Two PS993 power supplies in redundant mode with 13 A capacity @ 5 VDC
- One RP991 Dual Power Inlet with mains filter and switch
- Card installation from front and rear
- Internal switches connect and disconnect audio busses between backplanes
- Common sync bus across backplanes (use only one master sync source module)
- Common control bus across backplanes (use only one FC972 Remote)
- External dimensions in accordance with DIN 41494: depth = 320 mm
- Chromated aluminum side panels; aluminum cross extrusions; 0.8 mm, zinc-passivated steel covers for RF protection



PS993 power supply with RP991 dual power inlets (left); top view of IO93 frame layout (right)

Cooling

Install the IO93 with at least 1 RU of space above and below the frame and unrestricted airflow on the sides.

Master Sync Module

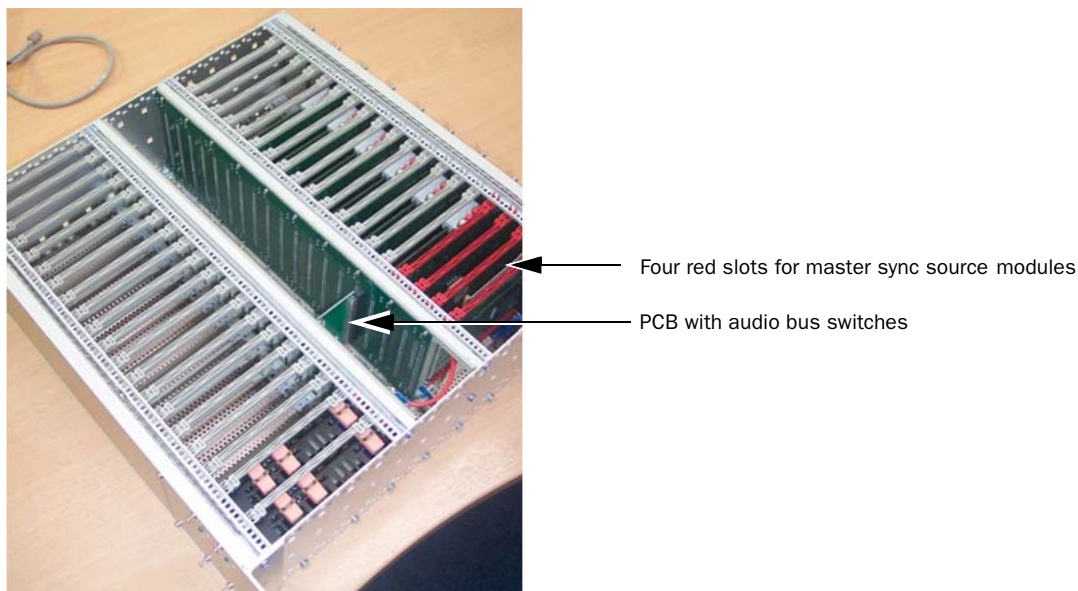
Make sure to install a master sync module in one of the red reserved slots before applying AC power. This is typically an SY983 Sync module, but the following other modules may be used as a master sync module when set to Master mode: MM935 MADI, MM936 MADI, DD915 8ch AES I/O, DD916 8ch AES I/O, and HD944 16ch De-embedder.

Place only one master sync module in the frame except when using two SY983 Sync modules in redundant sync mode. In this case, configure the SY983s for redundant sync operation and fit both modules into the frame's red reserved slots. See page 41.

The red reserved slots may be used for other modules after a sync module is installed.

Audio Bus Linking

The IO93 backplanes are linked by an internal interconnect PCB that contains 32 switches to link or separate the front and back audio busses. Some disassembly is required to access these switches. Since the Sync and Control busses of the front and rear planes are permanently linked, only one FC972 Remote and one master sync module are required.



IO93 with red master sync slots and PCB interconnect for audio busses

Control Bus

Each frame must be fitted with an FC972 Remote to externally configure all modules (except analog line in/out and WC984) and control mic preamps remotely using a web browser or console. Install only one FC972 per frame and up to two SY983s (for redundant operation, differentiated by Master/Slave setting).

A Module's system ID consists of the Frame ID + module CAN ID. The Frame ID is determined by the FC972's IP Address/Subnet/Host Address. The FC972 must be assigned a unique IP Address based on the frame's role within the system. A CAN ID must be set for each externally controllable module. Most modules have 32 CAN ID settings available but the AD914 Remote Mic Pre-amp has 16.

The FC972 and SY983 have default module CAN IDs that do not interfere with those of other modules. The internal CAN bus must be terminated once per frame, either on the FC972 or SY983.

Using the CAN Address switches on the FC972 or SY983 is an older method of setting the Frame ID. An explicit CAN Address must be set only when employing a hardware CAN-BUS remote controller to configure frames. In System 5, the Frame ID is set with the FC972's IP Address for configuration using a web browser interface.

Technical Specifications

Frame Size

Depth	320 mm
Rack Space	3 RU
Front plane Module Space	72 HP (18 single-width slots)
Rear plane Module Space	76 HP (19 single-width slots)
Weight	~5.3 kg

AC Power

Power Supplies	Dual redundant
Input	100–240 VAC 50/60 Hz auto-sensing
Output	13 A @ 5 VDC
Connectors	2 IEC

Audio Busses

Front Plane	32 audio busses
Rear Plane	32 audio busses
Linking	Front and rear plane audio busses may be linked using DIP switches on the interconnect PC board (some disassembly required)

Sync/Control Busses

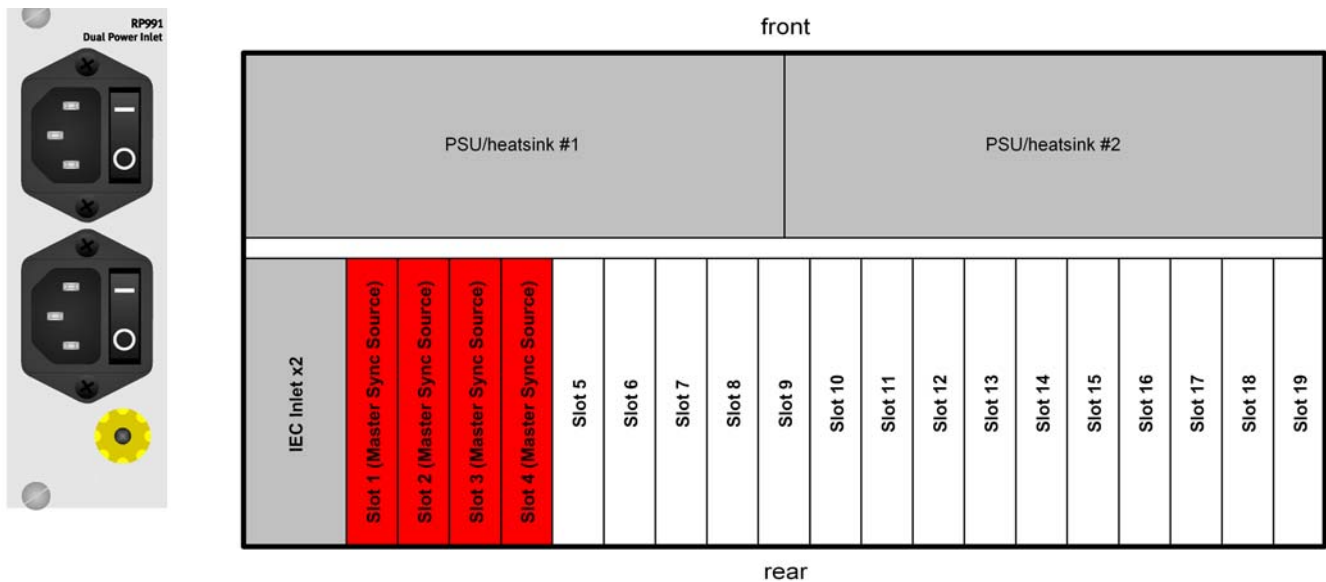
Sync Slots	Four reserved slots for master sync source (4 HP each) on rear plane (may be used for other modules)
Sync Linking	Common sync bus, linked between backplanes
Control Bus	Common CAN bus, linked between backplanes

Chapter 4: IO94 Stagebox Frame

The IO94 is housed in a 3-RU, RF-shielded, 19-inch modular chassis designed specifically for stagebox applications.

Features

- Two power supplies in redundant mode with 20 A capacity @ 5 VDC
- One RP991 Dual Power Inlet with mains filter and switch
- Rear plane card installation
- Common sync bus
- Common control bus
- External dimensions in accordance with DIN 41494: depth = 320 mm
- Chromated aluminum side panels; aluminum cross extrusions; 0.8 mm, zinc-passivated steel covers for RF protection



RP991 dual power inlets (left) and top view of IO94 Frame layout (right)

Cooling

Install the IO94 with at least 1 RU of space above and below the frame. There should be unrestricted airflow on the sides and over PSU heatsinks.

Master Sync Module

Make sure to install a master sync module in one of the four red reserved slots (left side of frame) before applying AC power. This is typically an SY983 Sync module but the following other modules may also be used as a master sync module when set to Master mode: MM935 MADI, MM936 MADI, DD915 8ch AES I/O, DD916 8ch AES I/O, and HD944 16ch De-embedder.

Place only one master sync module source in the frame except when using two SY983 Sync modules in redundant sync mode. In this case, configure the SY983s for redundant sync operation and fit both modules into the frame's red reserved slots. See "SY983 Sync HD" on page 41.

The four red reserved slots may also be used for other modules.

Control Bus

Each frame must be fitted with an FC972 Remote to externally configure all modules (except analog line in/out and WC984) and control mic preamps remotely using a web browser. Install only one FC972 per frame and up to two SY983s (for redundant operation, differentiated by Master/Slave setting).

A Module's system ID consists of the **Frame ID + module CAN ID**. The Frame ID is determined by the FC972's IP Address/Subnet/Host Address. The FC972 must be assigned a unique IP Address based on the frame's role within the system. A CAN ID must be set for each externally controllable module. Most modules have 32 CAN ID settings available but the AD914 Remote Mic Pre-amp has 16.

The FC972 and SY983 have default module CAN IDs that do not interfere with those of other modules. The internal CAN bus must be terminated once per frame, either on the FC972 or SY983.

Using the CAN Address switches on the FC972 or SY983 is an older method of setting the Frame ID. An explicit CAN Address must be set only when employing a hardware CAN-BUS remote controller to configure frames. In System 5, the Frame ID is set using the FC972's IP Address for configuration using a web browser interface.

⚠ *To avoid damaging analog circuits, install a master sync source module in a red reserved slot before applying AC power.*



IO94 front (left) and back (right)

Technical Specifications

Frame Size

Depth	320 mm
Rack Space	3 RU
Module Backplane Space	76 HP (19 single-width slots)
Weight	~5.3 kg

AC Power

Power Supplies	Dual redundant
Input	100–240 VAC, 50/60 Hz auto-sensing
Output	20 A @ 5 VDC
Connectors	2 IEC

Busses

Audio	32 audio busses
Sync Slots	Four reserved slots for master sync source (4 HP each) on rear plane (may also be used for other modules)
Sync Bus	Common sync bus
Control Bus	Common CAN bus

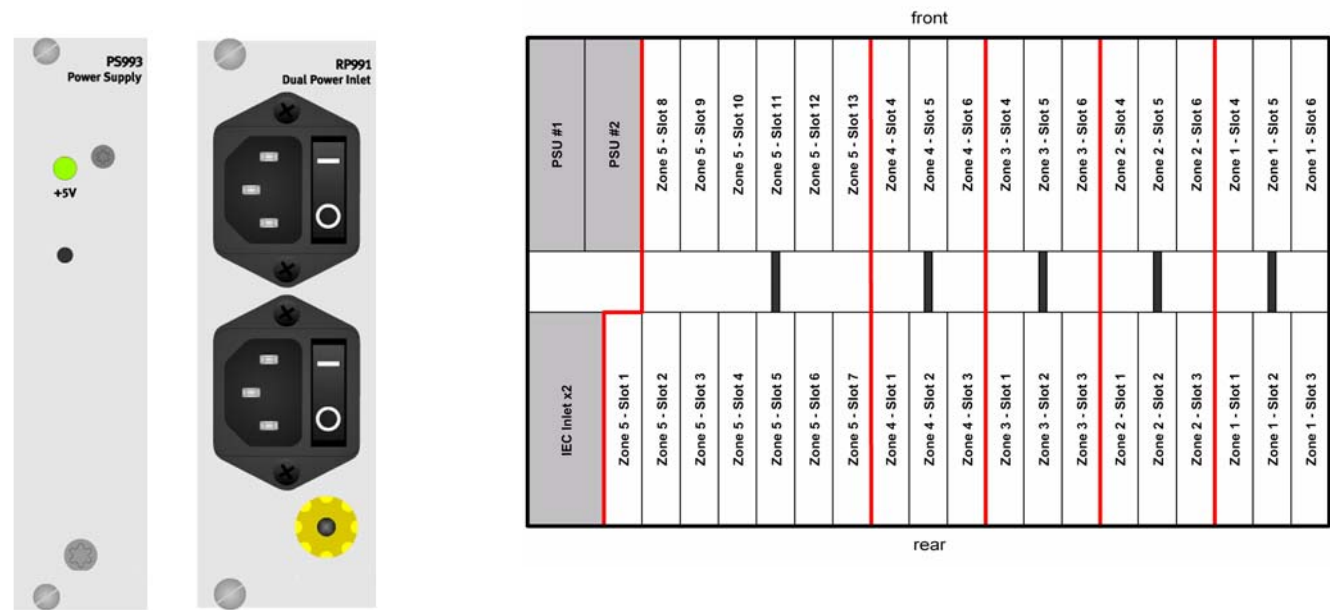
Chapter 5: IO95 Multi-Zone Frame

The IO95 Multi-Zone Frame is a 3RU frame with redundant PSU and two backplanes. The frame is divided into five discrete audio/sync zones. The IO95 accommodates applications that use multiple I/O streams, each referenced to a separate sync source.

For example, several Dolby-E encoder/decoders can be fitted into one IO95, each in its own audio/sync zone and referenced to separate sync sources. The audio is then fed into a central zone (using AES/EBU with SRC decoupling) where they are routed into a single MADI stream.

Features

- Two PS993 power supplies in redundant mode (13 A capacity at 5 VDC)
- One RP991 Dual Power Inlet with mains filter and switch
- Front and rear plane card installation
- Five discrete audio/sync zones
- Common control bus across backplanes; requires only one FC972 Remote
- External dimensions in accordance with DIN 41494: depth = 320 mm
- Chromated aluminum side panels; aluminum cross extrusions; 0.8 mm, zinc-passivated steel covers for RF protection



PS993 Power Supply, with RP991 dual power inlets (left) and top view of IO95 frame layout (right)

Cooling

Install the IO95 Frame with at least 1 RU of space above and below it and unrestricted airflow on the sides.

Audio/Sync Zones

The IO95 frame consists of five discrete sync zones, each requires its own master sync source. Although this is typically an SY983 Sync HD module (or two SY983s configured in redundant sync mode), an I/O module with Master mode may serve as a master sync source *but not in conjunction with an SY983 in the same zone*. Examples of modules with Master mode are MM935 MADI, MM936 MADI, DD915 8ch AES I/O, DD916 8ch AES I/O, and HD944 16ch De-embedder.

Only one master sync module source should be present in an audio/sync zone except when using two SY983s in redundant sync mode (see “SY983 Sync HD” on page 41).

Control Bus

Each frame must be fitted with an FC972 Remote to externally configure all modules (except analog line in/out and WC984) and control mic preamps remotely using a web browser. Install only one FC972 per frame and up to two SY983s (for redundant operation, differentiated by Master/Slave setting).

A Module's system ID consists of the **Frame ID + module CAN ID**. The Frame ID is determined by the FC972's IP Address/Subnet/Host Address. The FC972 must be assigned a unique IP Address based on the frame's role within the system. A CAN ID must be set for each externally controllable module. Most modules have 32 CAN ID settings available but the AD914 Remote Mic Pre-amp has 16.

The FC972 and SY983 have default module CAN IDs that do not interfere with those of other modules. The internal CAN bus must be terminated once per frame, either on the FC972 or SY983.

Using the CAN Address switches on the FC972 or SY983 is an older method of setting the Frame ID. An explicit CAN Address must be set only when employing a hardware CAN-BUS remote controller to configure frames. In System 5, the Frame ID is set with the FC972's IP Address for configuration using a web browser interface.

 *To avoid damaging analog circuits, install a master sync source module before applying AC power.*

Technical Specifications

Physical

Depth	320 mm
Rack Space	3 RU
Control Bus	Common CAN bus linked between backplanes
Backplanes	Rear- and front plane have five discrete audio/sync zones; 4 zones x 6 slots + 1 zone x 13 slots = 37 total slots; each active zone requires its own sync source
Weight	~5.3kg

AC Power

Power Supplies	Dual redundant PS993
Input	100–240 VAC, 50/60 Hz auto-sensing
Output	20 A @ 5 VDC
Connector	Two IEC

Part III: Modules

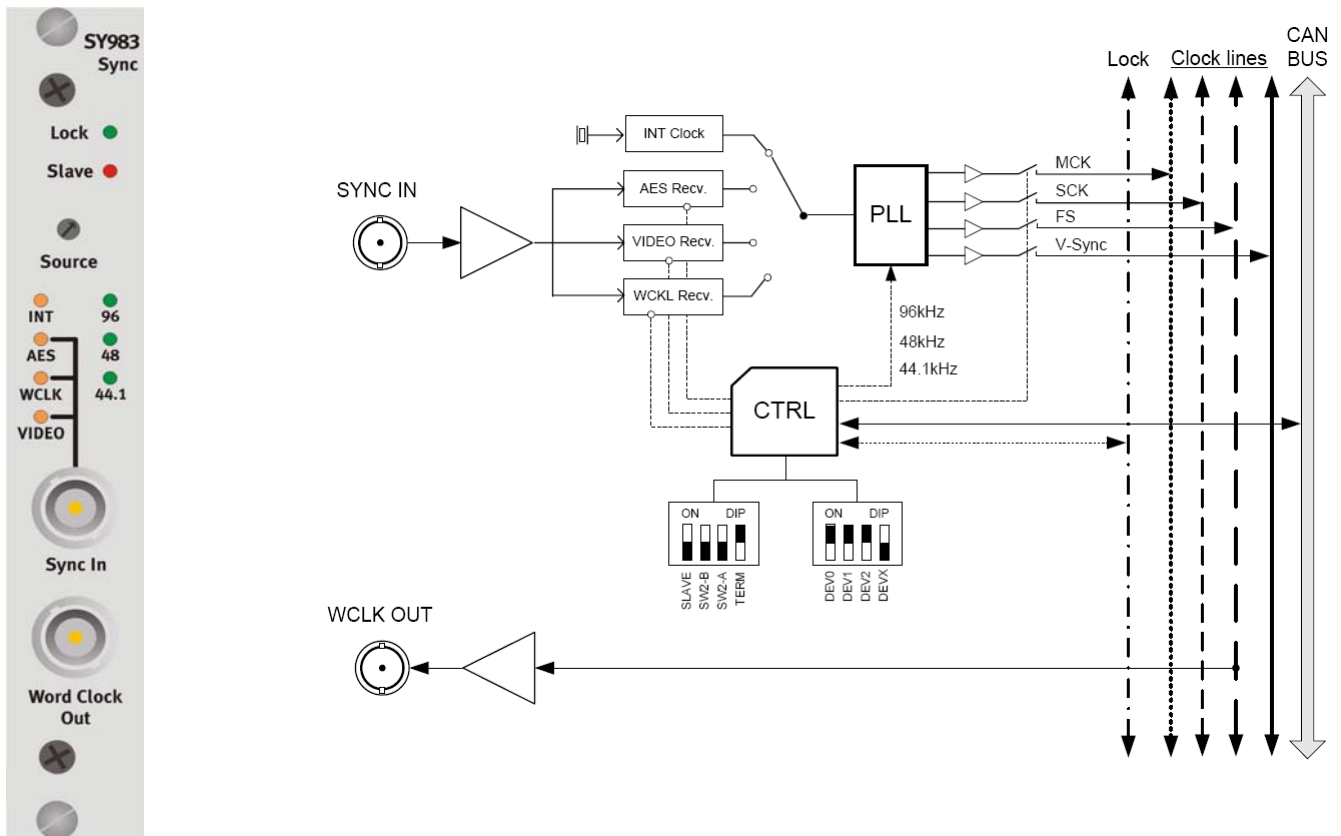
Chapter 6: Synchronization Modules

SY983 Sync HD

The SY983 is the standard sync module for a modular I/O frame.

Features

- Internal sync: 44.1, 48, 96 kHz
- External sync: AES, Word Clock, video reference
- Video reference: black burst (NTSC or PAL)
- Composite sync: 525, 625
- Tri-level sync: HD - 720p, 1080i, 1080p
- Lock indicator
- Slave indicator
- Redundant master/slave operation with two SY983s
- Wordclock output
- Front panel Source rotary encoder
- Configuration using a web browser interface



SY983 front panel (left) and block diagram (right)

Installation Considerations

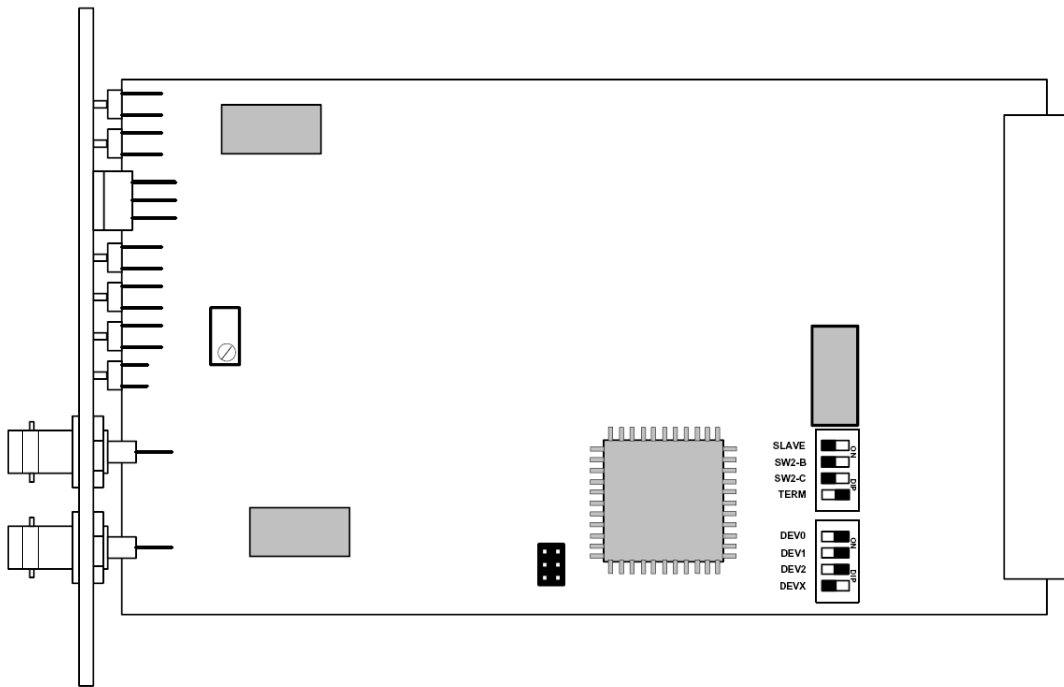
Frames employ the CAN-bus for internal communication. Each module must have a unique System ID that consists of the **Frame ID + module CAN ID**. The Frame ID is determined by the FC972's IP Address/Subnet/Host Address. The FC972 must be assigned a unique IP Address based on the frame's role within the system. A CAN ID must be set for each externally controllable module. Most modules have 32 CAN ID settings available but the AD914 Remote Mic Preamp has 16.

The FC972 has a default module CAN ID that does not interfere with those of other modules. The internal CAN bus must be terminated once per frame, either on the FC972 or SY983.

💡 *The SY983 has a preset CAN ID that cannot be changed so it will not interfere with other frame modules.*

A Modular I/O frame can employ two methods for remote control and configuration:

- **CAN remote controllers:** Set the frame address using the CAN Address switches, available on either the FC972 Remote or the SY983. Set the CAN Address on one of these modules *only*. The other module must be set to a non-active default value to avoid conflicts. This older method of setting an explicit CAN Address is used only when employing a hardware CAN-BUS remote controller to configure frames.
- **Web browser interface:** In current systems, the frame address is determined by the IP Address assigned with the FC972 Remote. The CAN Address switches on the FC972 Remote and the SY983 modules must be set to non-active default values to avoid conflicts.



SY983 internal configuration

⚠ *Insert the SY983 into one of the red reserved slots in the IO93 and IO94 Frames before applying AC power. For redundant sync operation, place both SY983s in these slots and do not set any other module to **Master** mode. In a IO95 frame, place one SY983 in each active sync zone (any slot).*

DEV0 – DEV2

These switches set the frame's overall CAN Address for legacy systems utilizing a CAN remote controller. In systems utilizing the web browser interface, DEV 0 – DEV 2 must all be set to ON (right position).

💡 *These switches appear on the FC972 Remote and must be set to non-active state on that module as well.*

DEV X

The DEV X switch accommodates legacy systems requiring a CAN remote to communicate with up to 16 modules spread across two frames. In single SY983 frames, DEVX has no effect. In redundant SY983 frames, the DEVX switch must be set to the same position in both modules.

TERM

The CAN bus must be terminated only once in a frame on either the SY983 or on an FC972 Remote.

 *Do not terminate the CAN bus twice.*

SLAVE

For fail-safe operation, a frame may be equipped with a second (redundant) sync module. Both sync modules must be placed in one of the red slots at the rear of the frame, close to the mains connectors.

- On one SY983 Sync module, set this switch to MASTER (right position), and set the other to SLAVE.
- Lock both SY983 modules to external sources synchronized to each other.

This prevents audio signal disturbance caused by phase and/or frequency shifts in case of a switch-over.

The SLAVE module permanently watches the LOCK status of the MASTER. In case of a MASTER failure (i.e., unlock condition, broken hardware), the SLAVE module takes over and continues clocking the frame while the red Slave LED flashes. If the MASTER module returns to lock status, it automatically takes over clock distribution, the SLAVE returns to watch mode, and the Slave LED lights solid again.

Sync Source Select

Select a clock source by turning the front panel's Source rotary encoder with a small screw driver. An LED display shows the clock frequency and sync mode.

The web interface shows the status of each sync module. In case of a severe sync problem, the Frame Controller can be programmed to send an SNMP trap and a GPO may be activated. A higher-ranking monitoring system may poll the status of the sync module(s) with SNMP.

Remote Configuration using a Web Browser

The SY983 supports configuring parameters using a web browser interface, which requires fitting an FC972 Remote in the frame.

 See "FC972 Remote" on page 35.

OVERVIEW Page

From the OVERVIEW Page of the web interface, click the SY983's wrench tool to see its configuration pages.

DEVICE Page

OVERVIEW

CONTROLLER
C8702

8CH MATRIX:
C8080

AUDIC FAIL CTRL
C8020

AM RADIO 1-8
C8081

TROUBLE
C8088

SYNC MASTER
C8830

SAT CH 5-6
C8048

FM RADIO MADRID
C8007

C8086 DEVICE 05
C8088

C840X DEVICE 0F
C8402

DEVICE

PARAMETERS

GPI

GPO

SYNC MASTER

C8830

Sync Module

Source

Internal

Sample Rate

48 kHz

Locked

Slave

DEVICE

Restart Module

RESTART

Initialize and restore factory defaults

INITIALIZE

Controller Version

03

Backup All Settings to File

BACKUP

Restore All Settings from File

RESTORE

Durchsuchen...

SY983 Web Configuration Device page

Slave LED

The Slave status is displayed on the left. The red Slave LED indicates this is a slave module in fail-safe operation.

Restart Module

Clicking RESTART initiates a warm start.

Initialize and restore factory defaults

Clicking INITIALIZE restores factory defaults.

Controller Version

Displays the module’s firmware version.

Backup All Settings to File

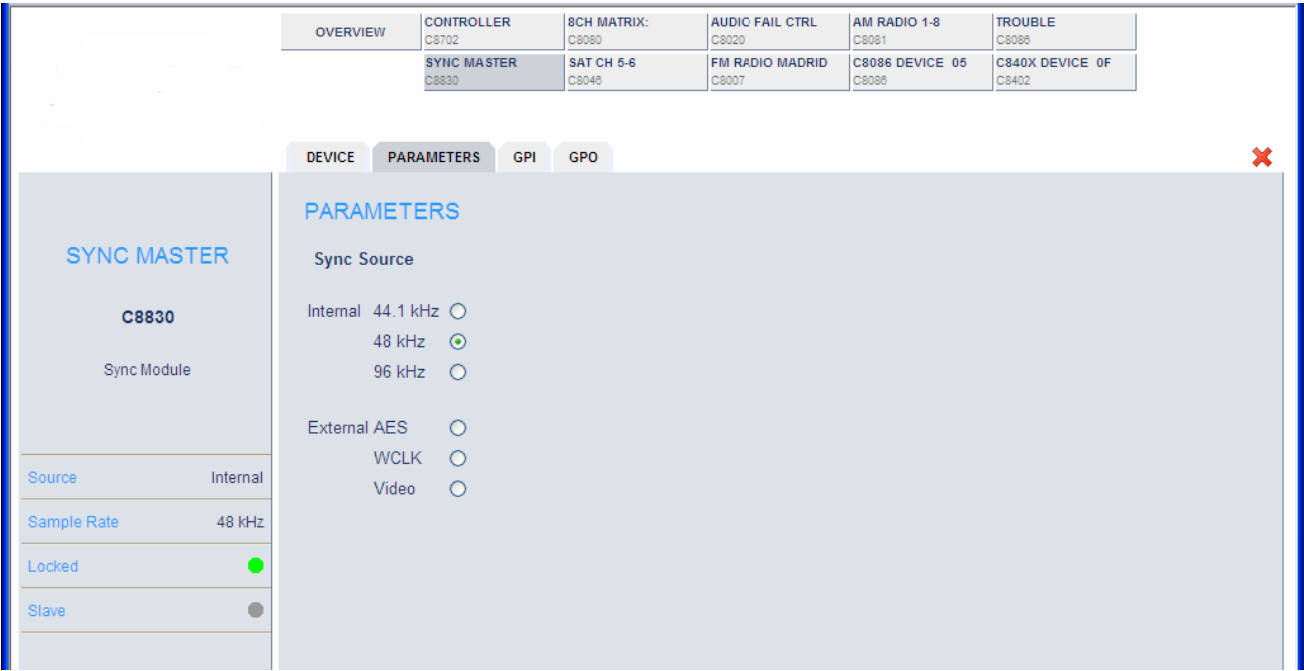
Clicking BACKUP stores the current settings to file on the configuration computer.

Restore All Settings from File

Clicking RESTORE restores settings from the file/destination on the configuration computer.

PARAMETERS Page

This page configures sync source parameters.



Web Configuration Parameters page

Sync Source

Setting the sync source here overwrites the settings made on the front panel’s rotary switch. Select from the following Sync Sources:

Internal: 44.1, 48, 96 kHz.

External: AES, WCLK, Video.

GPI Page

This page sets the sync source with GPI.

GPO Page

This page provides tally for the selected sync source.

Technical Specification

Internal and External Synchronization

Internal Audio Sync	44.1, 48, 96 kHz
External Sync Input	BNC, 75 Ω
External Sync Types	Video (BB, CS, TLS), Wordclock, AES/EBU sync

Video Synchronization

Types	Blackburst, Composite, Tri-level
Level	Blackburst/composite: 0.5–1 Vpp Tri-level: +/- 0.3 V
Formats	PAL/NTSC/HDTV
Rates	525, 625 1080i/50/59.94/60 720p/50/59.94/60 1080p/23.98/24/25/29.97/30/50/59.94/60
Wordclock Level	TTL-level @ 75 Ω
AES/EBU types	AES professional, AES consumer
AES/EBU level	0.5–5 Vpp @ 75 Ω

General Specifications

Backplane Connector	DIN41612, 64-pin, a+b, male
Power Supply	+5 VDC
Consumption	~300 mA
Dimensions	3 RU, 4 HP (1 slot)



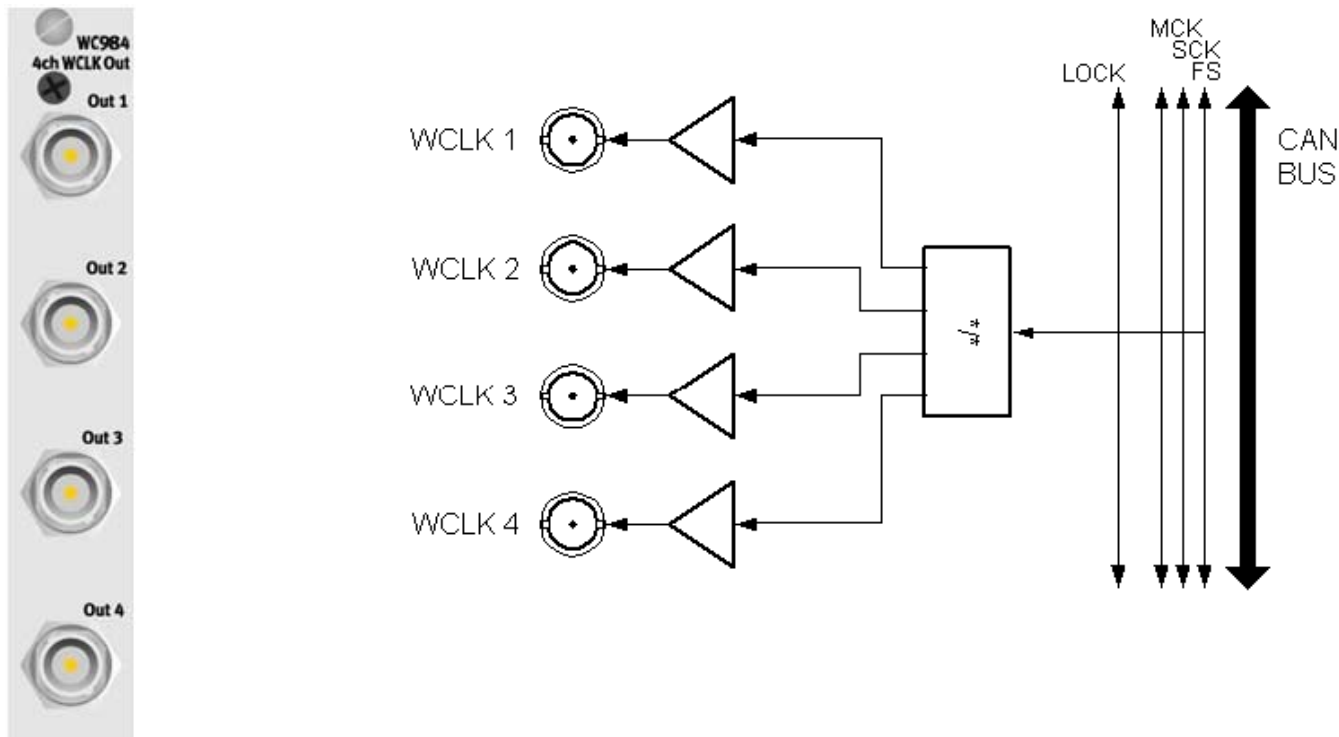
In typical applications, the SY983 sync module is the central clock source for a Modular I/O frame, providing all clocks for proper system operation (internal or external sync). Since audio signal distribution and processing within a Modular I/O frame is strictly synchronous, a reliable clock source is as important for system performance as a reliable power supply.

WC984 4ch WCLK Out

The WC984 is a wordclock synchronization output module for Modular I/O systems.

Features

- Word Clock outputs buffered four times
- Frame sync bus provides the sync source
- Sync output for sync-to-MADI frames



WC984 front panel (left) and block diagram (right)

Installation Considerations

The WC984 requires no settings.

Specifications

WC984 Specifications

Wordclock Output	44.1, 48, 96 kHz (follows frame's system clock)
Connector	Four x 75 Ω BNC coaxial
Level	TTL-level
Output Format	Wordclock
Backplane Connector	DIN41612, 64-pin, a+b, male
Power Supply	+5 VDC
Consumption	~100 mA
Dimensions	3 RU, 4 HP (1 slot)

Chapter 7: FC972 Remote

The FC972 Remote is an essential module to configure externally controlled modules and remotely control mic preamps using a web browser interface. Each frame type contains a single control bus and requires one FC972 to be installed in any frame position.

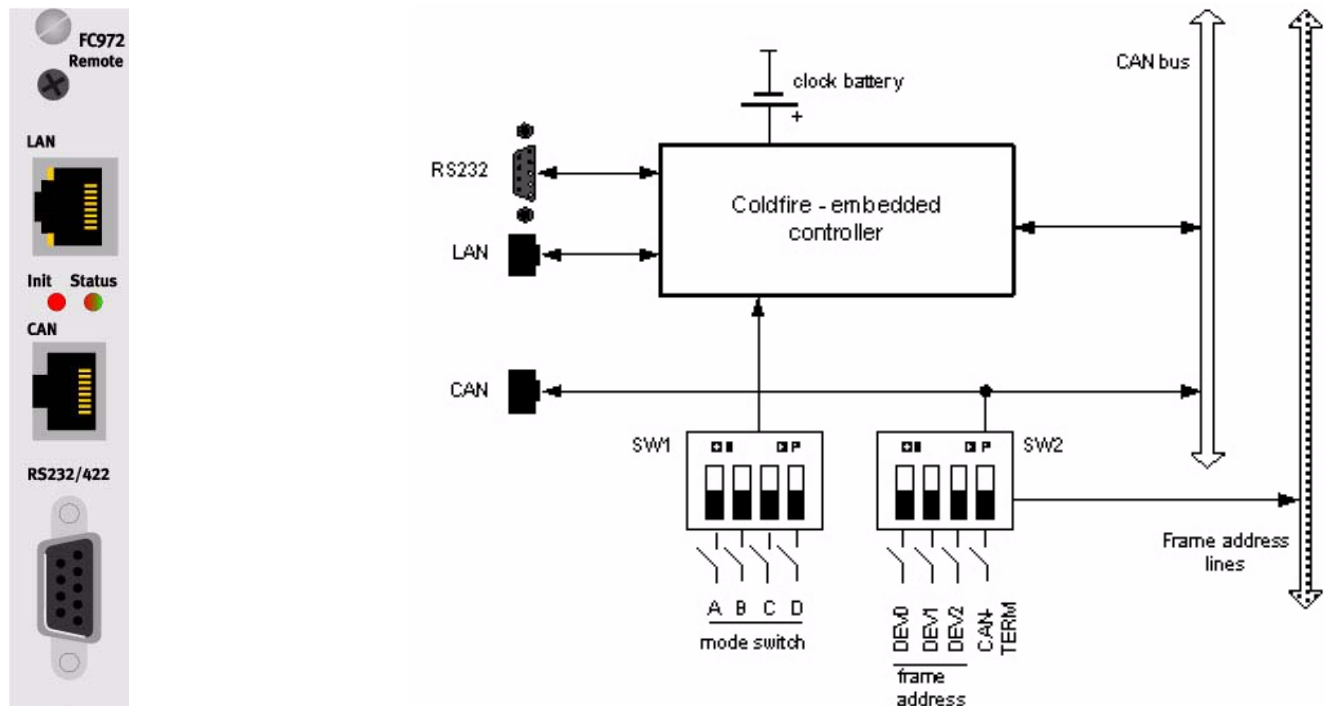
 During installation, be careful to adhere to the correct IP Address and CAN Bus termination instructions.

Features

- TCP/IP over Ethernet interface for Modular I/O frames
- Native CAN bus interface
- Web interface to configure and monitor modules
- Optional SNMP agent
- Three-tier security scheme with password checking

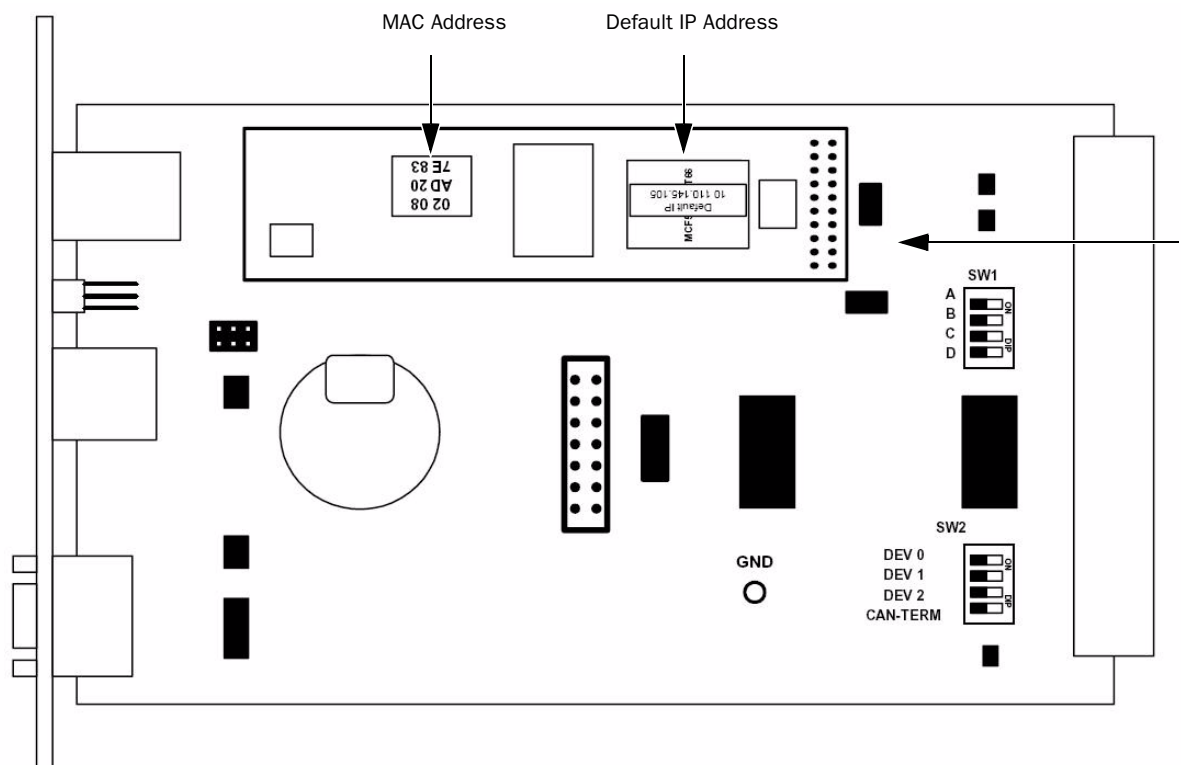
Front Panel

- RJ45 Ethernet connector
- RJ45 CAN connector
- RS232/422 connector
- 9-pin serial connector
- Init button
- Status LED



FC972 Remote front panel (left) and block diagram (right)

Installation Considerations

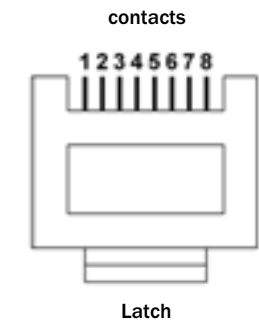


FC972 Module diagram

The MAC address is printed on the label indicated in the figure above.

The default IP address label is located on the Coldfire chip of the controller module and on the module’s front panel.

Connector Pinouts



RJ45 cable shown from cable entry side

RJ45 LAN Connector (NC for pins 4, 5, 7, 8)

Pin #	Signal
1	Tx +
2	Tx -
3	Rx +
6	Rx -

RJ45 CAN Connector (NC for pins 3, 6, 7, 8)

Pin #	Signal
1	CAN-H
2	CAN-L
4	GND
5	GND

9-Pin D-Sub RS232 Connector

Pin #	Function
1	DCD
2	TxD
3	RxD
4	DTR
5	GND
6	DSR
7	CTS
8	RTS
9	N.C.

Front Panel Init Switch and Status LED

The Status LED lights yellow while booting and green when operating.

The Init button supports warm module restart or full reset of the module to factory defaults.

To initialize the FC972 to factory defaults:

- 1 Press the Init button briefly.
- 2 After about 5 seconds the Status LED lights yellow.
- 3 Press and hold the Init button until the Status LED flashes three times.

 *Rebooting the FC972 has no effect on audio processing.*

SW1 Options

SW1 has four DIP switches that set options for graphics and redundant power. SW1-C has only one usable setting for System 5 products and SW1-D is unused.

SW1-A

ON: Enables graphics for System 5 products.

OFF: Not used for System 5 products.

SW1-B

OFF: Default setting for redundant power supplies.

ON: Use only if one power supply is installed in the frame to prevent false error status messages.

SW1-C

OFF: Default setting for IO93, IO94, IO95 Frames.

ON: Not used for System 5 products.

SW1-D

No current function. Set to OFF to avoid possible future conflicts.

SW2 Options

Frames employ the CAN-bus for internal communication. Each module must have a unique System ID that consists of the **Frame ID + module CAN ID**. The Frame ID is determined by the FC972's IP Address/Subnet/Host Address. The FC972 must be assigned a unique IP Address based on the frame's role within the system. A CAN ID must be set for each externally controllable module. Most modules have 32 CAN ID settings available but the AD914 Remote Mic Preamp has 16.

The FC972 has a default module CAN ID that does not interfere with those of other modules. The internal CAN bus must be terminated once per frame, either on the FC972 or SY983.

 *The FC972 has a preset CAN ID that cannot be changed so it will not interfere with other frame modules.*

A Modular I/O frame can employ two methods for remote control and configuration:

- **CAN remote controllers:** Set the frame address using the CAN Address switches, available on either the FC972 Remote or the SY983. Set the CAN Address on one of these modules *only*. The other module must be set to a non-active default value to avoid conflicts. This older method of setting an explicit CAN Address is used only when employing a hardware CAN-BUS remote controller to configure frames. In
- **Web browser interface:** In current systems, the frame address is determined by the IP Address assigned with the FC972 Remote. The CAN Address switches on the FC972 Remote and the SY983 modules must be set to non-active default values to avoid conflicts.

DEV 0 – DEV 2

These switches set the frame's overall CAN Address for legacy systems utilizing a CAN remote controller. In systems utilizing the web browser interface, DEV 0 – DEV 2 must all be set to ON (right position).

 *These switches appear on the SY983 and must be set to non-active state on that module as well.*

CAN-TERM

The CAN bus must be terminated once on either the SY983 or the FC972.

 *Do not terminate the CAN bus twice.*

Network Address Configurations

The FC972 and a web browser interface provides the network to connect and configure a Modular I/O frame and its modules. Since all Modular I/O frames require a web browser interface to enter module settings, configuring the FC972 Remote is a vital part of the installation procedure.

Microphone Preamp Control

The AD914 is controlled by System 5 and Max Air consoles by connecting the frame's FC972 Remote network port to the System 5/Max Air network switch. The console surface controls the mic settings (i.e., gain, +48 V phantom power, high-pass filter, etc.), which are saved to and recalled from console Title files.

For proper console mic control, the correct frame address must be used, which is determined by the IP Address of the installed FC972 remote. The following table shows addresses used by the system. The FC972 network Gateway setting is 192.168.0.1 in all cases (the address of the console's system computer).

Console Mic Control Port	TCC (ML530)	Frame IP Address
Mic Control Port 1	TCC2	192.168.0.150/255.255.255.0
Mic Control Port 2	TCC3	192.168.0.151/255.255.255.0
Mic Control Port 3	TCC4	192.168.0.152/255.255.255.0
Mic Control Port 4	TCC5	192.168.0.153/255.255.255.0
Mic Control Port 5	TCC6	192.168.0.154/255.255.255.0
Mic Control Port 6	TCC7	192.168.0.155/255.255.255.0
Mic Control Port 7	TCC8	192.168.0.156/255.255.255.0

 *Console mic control ports may be used by any combination of Modular I/O Mic Pre frames or ML530 Mic-Line Interfaces (controlled with a TCC serial control interface). Do not double-assign a mic control port by connecting an ML530 to a TCC control line and a Modular Frame addressed to that port's equivalent IP Address. For more information about TCC control, see the System 5 or Max Air Operational Manuals.*

Modular I/O frames without AD914 4ch Mic Inputs may also be connected to the console network, which lets the console's system computer configure modules. In this case, use an IP address in the range 192.168.0.157–159 to reserve Console Mic Control Port IP addresses for future expansion.

Modular I/O frames that do not contain AD914 4ch Mic Inputs may optionally connect to a separate facility network for configuration and use an appropriate address for that network.

All module settings are stored in the frame. Once configured, frames that do not contain mic preamps may be removed from the network.

IP Address Setup

 *These procedures should only be performed by individuals familiar with Internet Protocol.*

There are two methods to change the FC972's IP configuration:

- **Serial connection:** Requires a PC running a *terminal* program to create a serial connection between the PC and the FC972.
- **Network connection:** Requires a PC running a web browser and a known IP address for the FC972. If the address is not known, initialize the module to factory default settings to restore a known default IP Address (see “Front Panel Init Switch and Status LED” on page 52).

To make a serial connection:

- 1 Connect the FC972 to a PC's COM port. Use a physical or virtual COM port (using a serial USB adaptor) and connect it with a 1:1 RS232 cable.
- 2 Run a terminal program (115.2-8-N-1, no handshake).

```
-----
Configuration menu
IP Address.....: 10.110.51.171
Software Revision: rel_1_6_0_3523
Uptime.....: 00:03:06:47
Please choose:
  1: Manage Passwords
  2: Change Network Configuration
  6: Restore Factory defaults
  7: Reboot
  8: Show memory statistics
  9: Evaluate JavaScript input
 10: Toggle web server logging (currently off)
 11: Toggle CPU load monitoring
  0: Exit to CLI
Your choice:
```

Terminal program to set new IP address

- 3 Select Change Network Configuration. You must set an IP address and the subnet mask. If you skip the Netmask entry, the IP address will not be changed.
- 4 Select Reboot and enter <y> and <ENTER> to start the reboot process.

To make a network connection:

- 1 Connect the FC972 to a PC using either an Ethernet crossover cable or connect both the FC972 and PC to a network switch.
- 2 Change the PC's network setting. The PC must be assigned an IP Address/Subnet in the same address range as the FC972.
For example, if the default IP address of the FC972 is 10.110.134.142 / 255.255.0.0, set the PC to 10.110.134.143 / 255.255.0.0 or similar.
If the FC972 IP address is unknown, either use the serial connection described above or restore the module to factory default settings (see “Front Panel Init Switch and Status LED” on page 52).
The factory default IP address is printed on a label inside the controller module (see “FC972 Module diagram” on page 50). The factory default subnet mask is 255.255.0.0.

 *Make sure the factory default IP address is legible on the label before restoring the module to factory defaults.*

- 3 Open a browser (IE7, Firefox 3.0 or higher) and enter the FC972's IP address in the URL field (i.e., <http://10.110.134.142>).
- 4 Click on the wrench tool on the CONTROLLER field. This opens the FC972's SYSTEM CONFIG page.



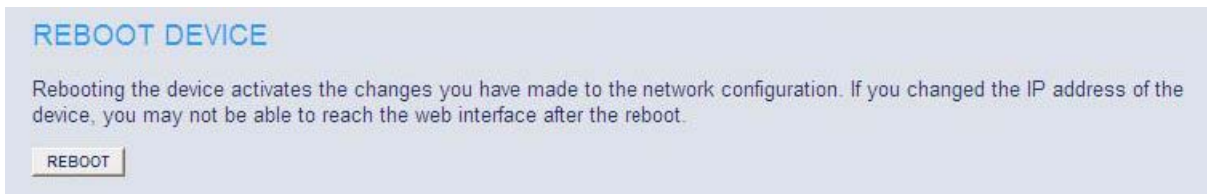
Frame Controller Overview page

- 5 Enter the proper NETWORK settings.



NETWORK settings

- 6 Select CHANGE NETWORK CONFIGURATION.
- 7 Reboot the FC972.



REBOOT CONTROLLER tab

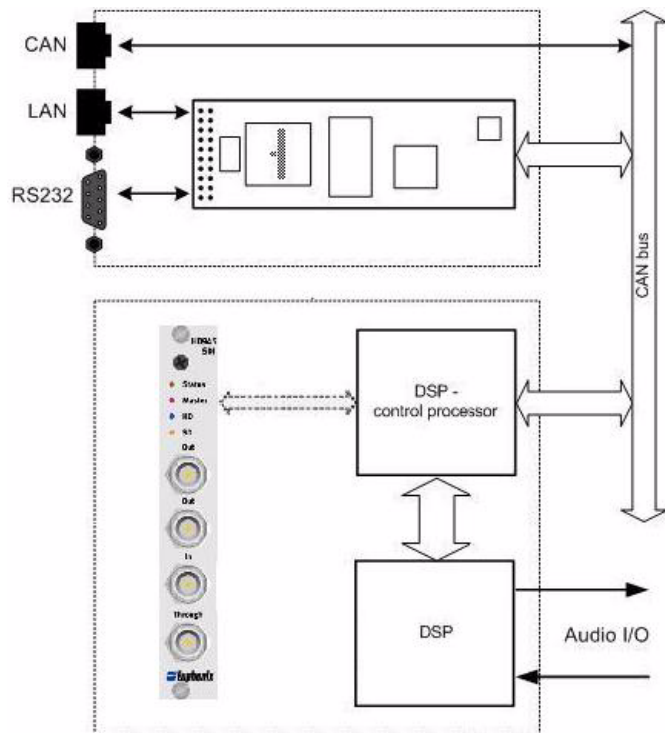
- 8 Reconfigure the PC's network address to communicate with the FC972 if necessary.

Remote Configuration using a Web Browser

Modular I/O frames are remote controlled and configured through a network connection between the FC972 and a PC running a common web browser. This Ethernet-based external access is maintained by a dedicated 32-bit communication processor in the FC972 that runs an HTTP server, a UDP server, and an SNMP agent.

After launching the browser on the PC and entering the frame's IP address, all data including GUI is served out from the FC972 to the browser window. Device-specific configuration software is not required on the PC.

The FC972 communication processor does not directly control the module parameters. Instead, it transfers commands and data between the individual module's processors which control their parameters and GPIOs. The FC972 communication processor and individual module processors both communicate internally over the CAN bus. This two-stage approach insulates external communication from audio processing so the Frame Controller's firmware can be updated without disrupting audio. The functions available from the GUI interface may vary with different versions of the Frame Controller's firmware.

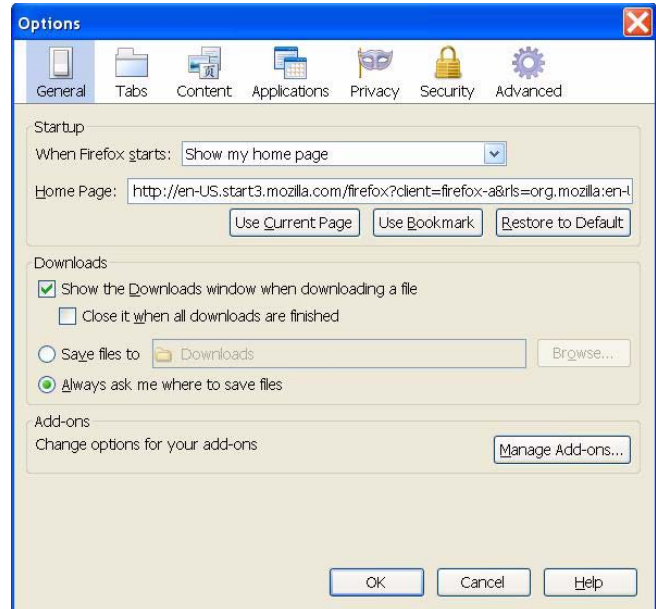
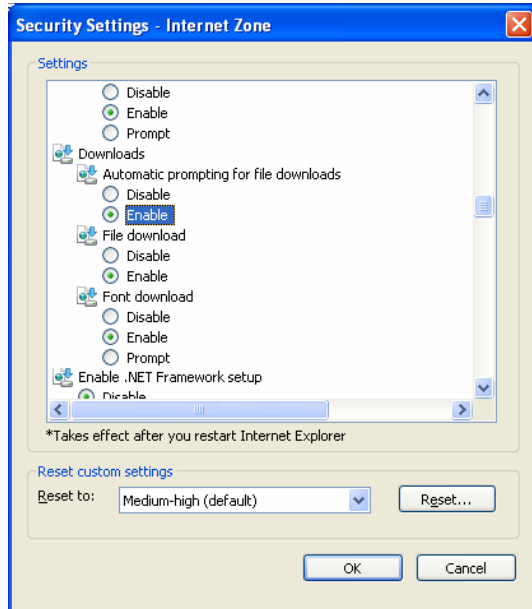


FC972 module example

Settings For IE 7 And Firefox 3

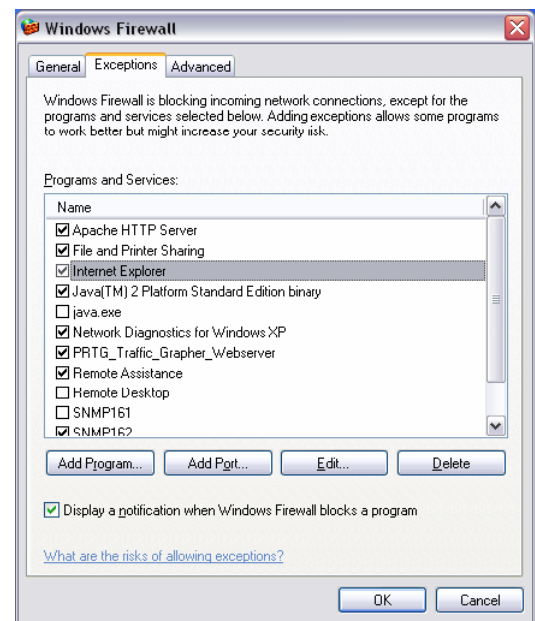
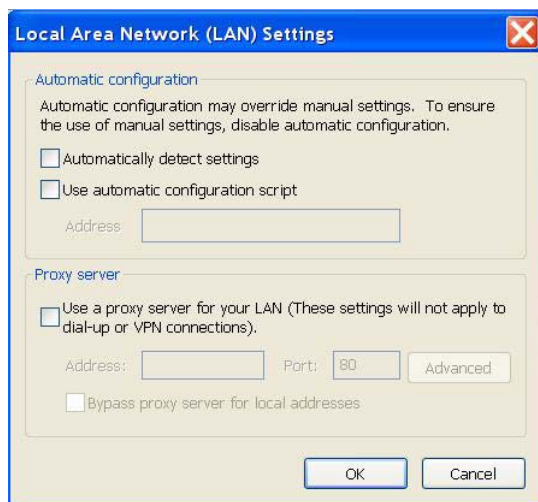
The FC972 supports GUI functions for IE 7.x and Firefox 3.x. For proper operations, these settings may be required:

- The browser must allow cookies from Modular I/O units. Pay special attention to settings of third-party tool bars (like Yahoo) which may overwrite the browser's settings.
- To receive files (i.e., frame backup) from the Frame Controller, select the security option:
Tools > Internet Options > zone = Internet > Custom level ... > Downloads.



Download settings for IE (left) and Firefox (right)

- Java Script must be allowed.
- Java Virtual Machine must be installed on the PC to receive level meter display (feature not currently available). Free download is available from SUN Microsystems at <www.java.com>.
- If your PC is part of a MS Domain, check that the LAN settings are correct. If the IE settings are manually configured and the PC is part of a MS domain, disable Automatically detect settings. Otherwise the settings may be overwritten automatically.

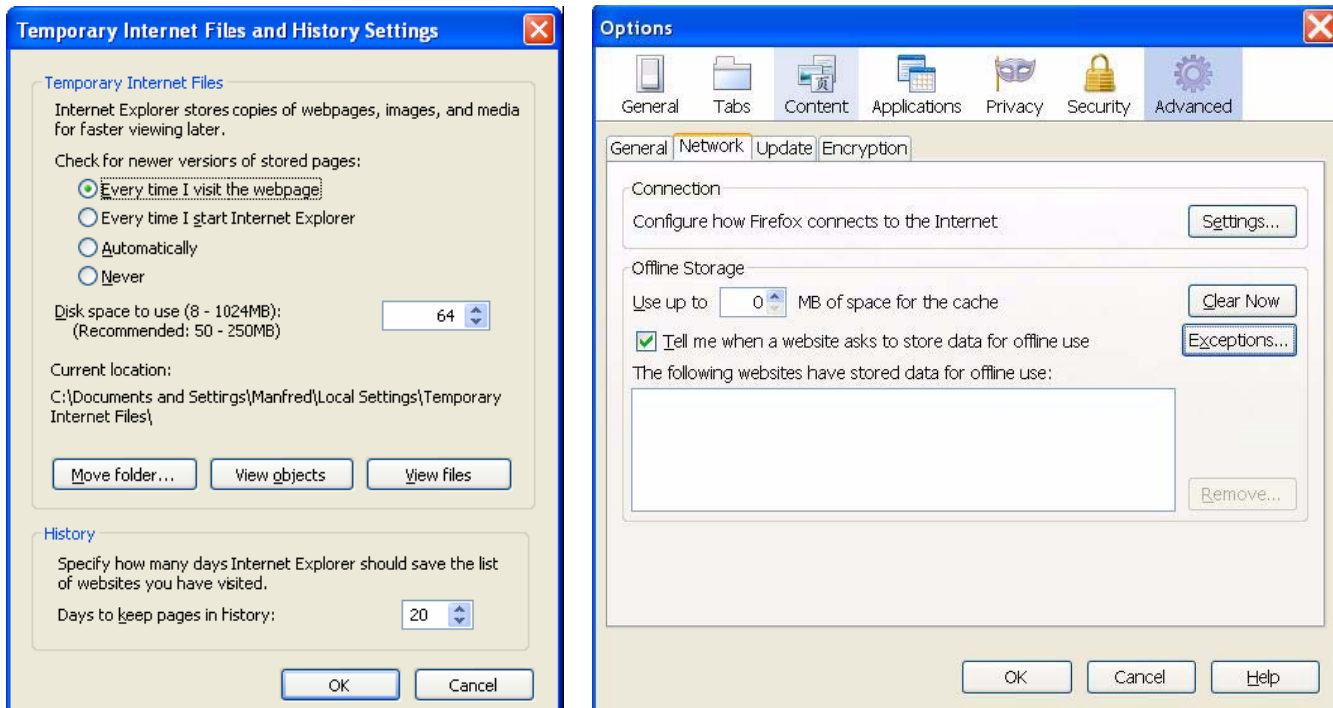


IE LAN settings (left) and Windows Firewall (right)

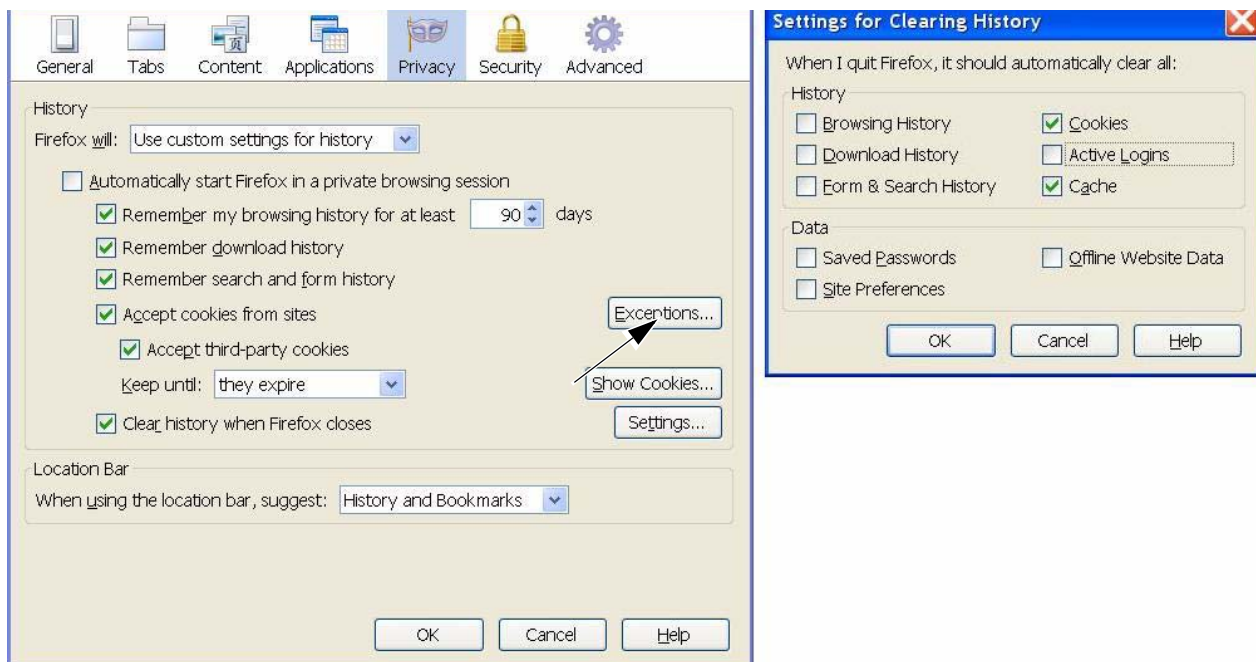
- Declare IE (and/or FireFox) as an exception for the Windows Firewall to maintain proper UDP data transfer from and to the JAVA applet.
- If you notice security issues, you may use the UDP PORT RANGE configuration (see “Setting the UDP Port Range” on page 59) to limit the UDP port numbers instead of making an exception for all incoming network connections.
- Disable the browser’s caching features. The FC972’s web pages are designed to operate in LANs. The strategy developed for surfing the internet (caching web site elements to save bandwidth download time), may confuse a more technical application like the FC972 because it dynamically generates elements that must be gathered live from the web server.

IE: Set Check for newer versions of stored pages to Every time I visit a webpage

Firefox: Set Offline Storage to 0 MB of space for the cache.



Temporary Internet file settings for IE (left) and cache for Firefox (right)



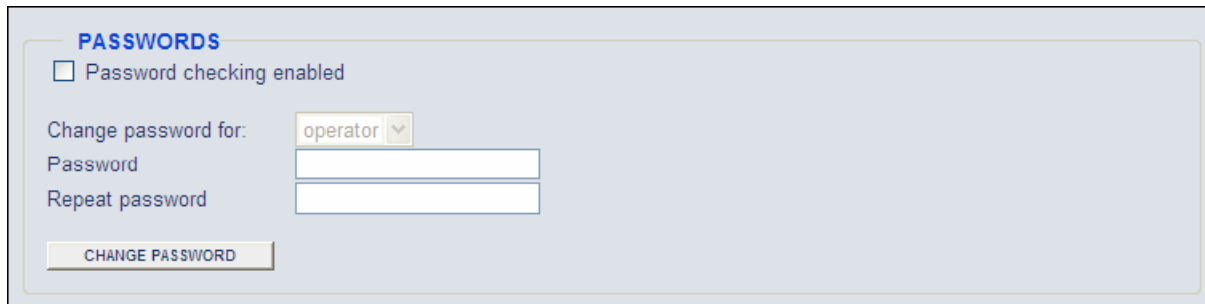
Firefox Privacy tab (left) and Settings for Clearing History (right)

Activating the Security Feature

The FC972 Remote offers a three-tier security scheme:

- *Viewers* can only see status information and level displays.
- *Operators* have Viewer privileges and can also load presets.
- *Administrators* have Operator privileges and can also set up frames, change module parameters, and write presets.

- 1 Select Password checking enabled to activate this feature.
- 2 Reboot the Frame Controller.
- 3 Use the default user and password (*user admin* and *password admin*) to log in as the administrator.
- 4 Set up personalized user and password settings for administrator and operator.

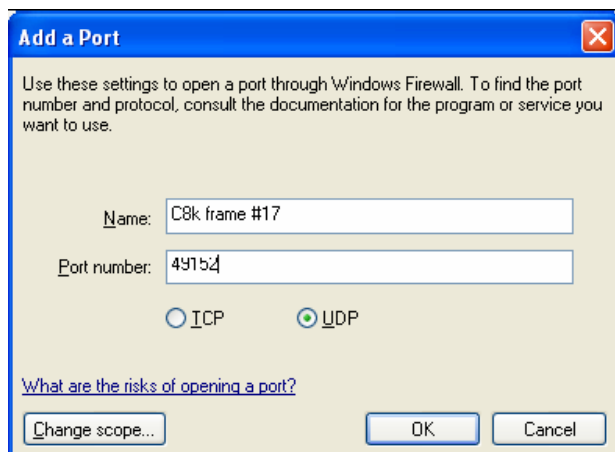


Password checking enabled

Setting the UDP Port Range

To receive meter display data if a local firewall is active, UDP ports must be reserved for which the firewall will be held open.

- 1 Right-click on the network symbol in the Windows task bar.
- 2 Select Change Windows Firewall settings.
- 3 Select the Exceptions tab.
- 4 Open the Add a Port page.
- 5 Select UDP and assign this rule a unique Name and Port number.



Add a Port page

To connect from *different PCs to the same device*, use one UDP port per device because different PCs open a different IP socket connection for the same device.

To connect from *one PC to different devices*, a unique UDP port number must be set for every remote device so assign a range of UDP ports for the Frame Controller.



UDP Port Range Metering settings

⚠ Connecting multiple Java applets from the same PC to the same device is not implemented! In this case, the next browser session gets UDP data from that device but the previous applet is terminated.

Updating the FC972 Remote Firmware

The FC972's firmware must be burned into its flash memory. Firmware is downloaded as a compressed ZIP file containing the firmware image and may also contain dedicated module firmware packed into an archive file and relevant documents. After downloading, decompress the files and save them to a known directory on the configuration PC. Contact Avid professional support for information on available firmware.

To update the FC972's firmware:

- 1 Open the frame's web browser interface and click the wrench tool inside the FC972 graphical symbol.
- 2 Select the SOFTWARE UPDATE tab.



Frame Controller firmware update

- 3 Click the SEARCH button and navigate to the appropriate image file. This may be on the PC or elsewhere on the network.

- Click the START UPDATE NOW button. A progress bar appears when the update process starts. The controller uploads the image file from the PC into its memory, erases the flash memory, and burns the new image. A dialog appears when finished.
- Click OK and the browser reloads the website from the FC972 Remote. If you still see old firmware version number, flush the browser content by deleting temporary internet files and cookies, and connect with the frame.

 This is a clear indicator that the caching feature of the browser is still active (see “Settings For IE 7 And Firefox 3” on page 57).

Emergency Update Of the FC972 Firmware

If for any reason the standard firmware update process is not successful:

- Reboot the FC972 by briefly pressing the front panel’s Init button or reboot from the web browser interface.
- After it reboots (approximately 40 s), open the web browser and enter the following URL: http://<FC972 IP Address>/stand-alone-update.html. The following page opens:

SOFTWARE UPDATE

To update the software, please use the file selection box to choose the firmware file, then press the "start update" button to perform the update operation.

IP-Address

10.110.51.171

Firmware-File

SEARCH

START UPDATE

Software Update

- Proceed with the image update as described above. A dialog appears when finished (4–5 minutes).
- Reset the FC972 manually by pressing the Init button or reboot from the web browser interface.

 The method by which the Frame Controller’s image is sent from the PC and burned into the flash memory has been rewritten to overcome a possible bottleneck of non-fragmented RAM. If updating from an older version (< 2660), reboot the Frame Controller before starting the image update to make sure there is enough non-fragmented RAM.

Module Firmware Bulk and Single Update

These tools load software from archive files with the FC972 image.

Contact Avid professional support for information on available firmware and how to install it: 650-237-1604.

Modules Licensing

Several features of the system, including the SNMP feature of the FC972, are options that must be enabled after purchase.

To obtain the frame’s Licensing Information file:

- Select CONTROLLER > SOFTWARE UPDATE > MODULES LICENSING. The table below shows the license status of that frame.

Frame Controller

C8702

Ethernet / CAN / Serial-Interface and Web Server

Image Version

trunk_5218

Temperature

31.5°C

Power Status

MODULES LICENSING

This table displays all the modules in a C8000 frame with their serial number and the enabled features.

ID	Model	Controller Version	Serial Number	Features
0	c8404	8	not supported	
	c8702		JA-5C5068D	snmp, dolby, 8channels, hd
2	c8082	95	not supported	
3	c8088	5	not supported	
6	c8611	14	not supported	
8	c8403	95	not supported	

SAVE LICENSE INFO

To apply a license file to the system please select the relevant license file with the browse button below. Then press the "APPLY LICENSE NOW" button to activate the license. The license file will be applied to the module for which the license was generated.

License file

Search...

APPLY LICENSE NOW

BACK

Modules Licensing

- 2 Click SAVE LICENSE INFO and an XML file is generated that should be saved and sent to Avid sales/support. Avid returns a License File that must be uploaded to the FC972 Remote.
- 3 Click the SEARCH button to navigate to the file.
- 4 Click APPLY LICENSE NOW.



We recommend updating modules before applying the license key file to the frame because some license features require the latest firmware.

SNMP Functions Setup

Modular I/O supports SNMPv1 GET PDUs (Protocol Data Unit) for polling the Modular I/O frame only. SNMP SET PDUs are not supported. The agent may also send Traps on predefined conditions and/or fire GPOs using GPIO interface(s). SNMP protocol is an optional Modular I/O system feature that can be purchased if required.

To set up SNMP functions if the SNMP option has been activated:

- 1 Open the FC972 SYSTEM CONFIG page. The Frame Name, Frame Location, and System Contact are used by the SNMP sysObject OIDs (Object Identifier).

FRAME

Frame Name: Premium channels

Frame Location: rack17 tray07

System Contact: info@junger-audio.com

SET FRAME INFORMATION

SNMP Setup

- 2 Click SET FRAME INFORMATION.
- 3 Enter a Trap Sink IP Address, Trap Port, and the Trap Community string, which must be used for basic authorization.
- 4 Select desired SNMP Traps and/or set a GPO number for GPIO modules to use.
- 5 Click CHANGE SNMP CONFIGURATION when finished.

SNMP

Trap Sink IP Address: 10.110.255.255

Trap Port: 162

Trap Community: public

Send SNMP Traps

☐ Cold-start	GPO OFF
☐ Warm-start	OFF
☐ Temperature High	OFF
☐ Power Failure	OFF
☐ Sync Lock Failure	OFF
☐ Module Failure	OFF
☐ Interface Input Lost	OFF
☐ Bus Input Error	OFF
☐ Processing Error	OFF
☐ Authentication Failure	OFF

CHANGE SNMP CONFIGURATION

SNMP Trap Configuration

SNMP Operation

The FC972's SNMP agent polls the system and generates status information. Modules are polled continuously and the status information is condensed for the entire frame. An external monitoring tool (SNMP Manager) may poll the SNMP agent based on the Modular I/O Audio MIB (Management Information Bases). The MIB and associated document can be received upon request.

The SNMP manager can also *sit and wait* to receive Traps from the SNMP agent and poll the frame afterward. The procedure depends on the implementation of the management tool. For generic monitoring applications, the Modular I/O frame may be equipped with GPIO module(s). In this case, the system can fire GPOs (relay closures) based on the settings made in the previous section.

Operational Hints

Website display relies on data received by the browser from the web server of the communication processor on demand (i.e. it polls the web server). The polling process is divided into time slices of different priorities and the browser content is not updated automatically for all areas. Therefore, a manual reload is recommended to update the current state of the parameters displayed in the GUI.

If a module dies or is removed from the frame, the module's graphic turns red (see below).



SNMP Trap Configuration

The red graphic can only be cleared by inserting a good module. If the module is permanently removed, reset the FC972 Remote by briefly pressing the Init button on the front panel, REBOOT from the web interface, or select REBOOT from the serial interface menu. Then reload the browser content.

⚠ *The new module must be of the same type and have the same CAN address as the one removed. If a different module type is used with the same CAN address, reboot the Frame Controller!*

The browser session with the web server of the FC972 Remote may sometimes expire. In this case, Java Script at the browser site may still work but no commands are accepted by the web server. Opening the serial console interface may display a message similar to this:

Authorization failure for request "GET /" by user 'anonymous', required privileges are 'administer', but user's privileges are none.

Close and restart the browser to open a new session.

To change some parameter values, the GUI may use a slider. After clicking on an input field, move the slider with the mouse pointer, keyboard arrow keys, or by the mouse wheel, which scrolls vertically if active.

AM RADIO 1-8

C8081

8 Ch Limiter

Preset

PARAMETERS

Link Mode
☐ 8x1 Chan
☒ 4x2 Chan
☐ 2x4 Chan
☐ 1x8 Chan

C1.2	C3.4	C5.6	C7.8	
Gain 3.3	0.0	0.0	0.0	dB
Threshold -10.0	-10.0	0.0	-10.0	dBFS
Program pop	pop	pop	speech	
Transparent				

Using a slider to change parameter values

Error Monitoring

When an upstream error condition (i.e., processor module) that results in signal loss at the embedder input is detected, the module switches to an alternative bus for fail-safe operation. The alternative bus can be a similar signal bypassing the processing module (i.e., processor input signal), or an alternate audio signal (i.e., pre-recorded announcement).

C840X DEVICE 08

C8402

8 Channel SD Embedder/De-Embedder

Preset

P1 (modified)

SRC

SD

De-Embedder

Gr1-1/2 3/4

Gr2-1/2 3/4

Gr3-1/2 3/4

Gr4-1/2 3/4

Embedder (Bus Status)

Out 1/2 PCM

Out 3/4 PCM

Out 5/6 PCM

Out 7/8 PCM

BUS-ROUTING

Input / Output Mux Format

☒ 2CH
☐ 8CH

From C8000 Bus to Embedder

Main Input	Alternative Input	Auto Mode	Error Detection
Ch 1/2 S5 active	S1	☒ TEST	☒
Ch 3/4 S6 active	S2	☒ TEST	☒
Ch 5/6 S7 active	S3	☒ TEST	☒
Ch 7/8 S8 active	S4	☒ TEST	☒

Off
☐ On
☒

If there is an error detected for some channels, an alternative input may be used for fail safe operation. Also a "busInputError" will be generated for use by SNMP.

Auto mode is possible only if Error Detection is enabled.

All inputs which are not used for embedding, should be disabled for error detection.

From De-Embedder to C8000 Bus

Ch 1/2
Ch 3/4
Ch 5/6
Ch 7/8

Enable C8000 Bus Driver ☒

BUS-ROUTING page

Monitoring the Processing Status of a Processing Module

The most important audio processing module parameter is its momentary gain, which is permanently changed by an adaptive dynamic process like LevelMagic™. If this gain persists too long at one end of its working range, the processing parameters should be checked.

The definition of the Level Magic persistent condition is:

The low-pass weighted average gain of the process is equal to or greater than the Leveler max Gain.

Processing monitor status may be turned on for each channel by selecting their respective Proc Status Monitor checkboxes. It is important to turn off unused processing channels to prevent false alarms if the error condition is monitored by an external entity.

C8446 DEVICE 06

C8446

4 Channel SD-SDI

Level Magic Preset

modified: USER 1

SDI Preset

PRESET 1

Bypass

Audio

SDI

SDI Input

SD

De-Embedder

G1-1/2

G2-1/2

G3-1/2

G4-1/2

3/4

3/4

3/4

3/4

Processing

Ch1

Ch2

Ch3

Ch4

Metering

Level Magic Process Control

Level

Loudness (ITU-BS.1770)

Bypass

C1

C2

C3

C4

Input Gain

0.0

0.0

0.0

0.0

dB

Leveler

Operating Level

-20

-18

-16

-14

dBFS

Time

40s

40s

40s

40s

s/min/h

max Gain

10

10

10

10

dB

Freeze Level

-50

-50

-50

-50

dBFS

Transient Processor

Response

mid

mid

mid

mid

max Gain

10

10

10

10

dB

Limiter

max Peak Level

-9.0

-9.0

-9.0

-9.0

dBFS

Processing

uni

uni

uni

uni

Link

Dit Transparent

Off

On

Auto

Proc Status Monitor

Level Magic Process Control

The processing status is displayed on the bottom-left side of the page above.

💡 Avid does not currently offer processing modules for Modular I/O Frames.

Technical Specifications

Controller Module

Microcontroller	MCF8250 Coldfire
FLASH	8 Mbyte
RAM	16 Mbyte
RTC	DS 1306
OS	eCos

Front Panel External Connectors

LAN (RJ45)	10/100 Mbit Ethernet
RS232 (9-pin D-Sub)	Controller serial interface
CAN (RJ45)	CAN 1.1 (125 kBit/s)

Default Settings

IP address	10.110.xxx.yyy where xxx and yyy is derived from the MAC address of the Ethernet interface
Subnet Mask	255.255.0.0
Gateway	No entry
Controller Id	0
Frame Address	0
CAN Termination	OFF

General

Backplane Connector	ref. to DIN41612, 64-pin, a+b, male
Power Supply	+5 VDC
Consumption	~300 mA
Dimensions	3 RU, 4 HP (1 slot)

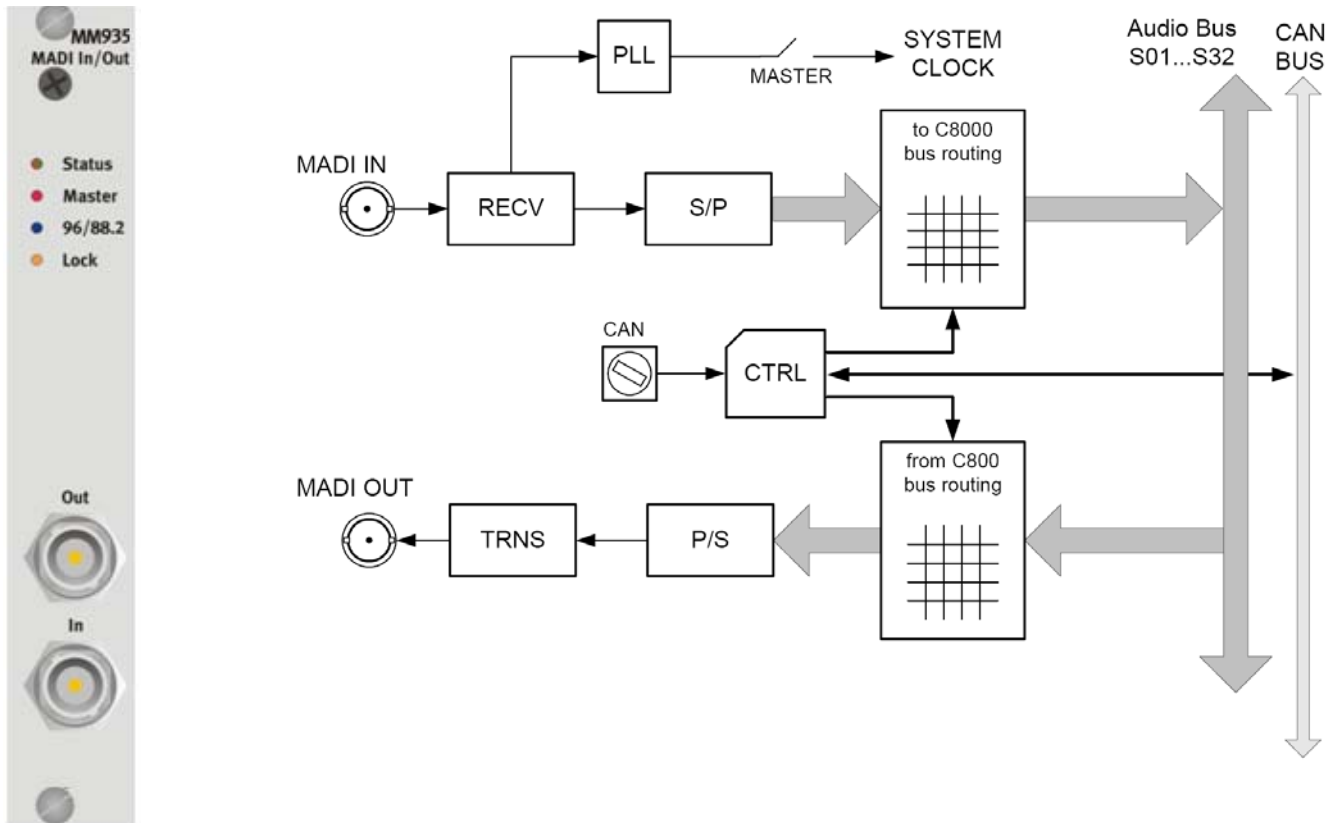
Chapter 8: MADI Modules

MM935 MADI In/Out (Coaxial)

The MM935 is an I/O interface for MADI multichannel audio signals.

Features

- 75 Ω BNC connection
- Extended mode: 64 channels @ 48 kHz
- High sampling mode: 32 channels @ 96 kHz
- 24-bit word length
- In Master mode, frame locks to MADI input without requiring an SY983 Sync module
- Full crosspoint matrix configuration/setup using a web browser interface



MM935 front panel (left) and block diagram (right)

Installation Considerations

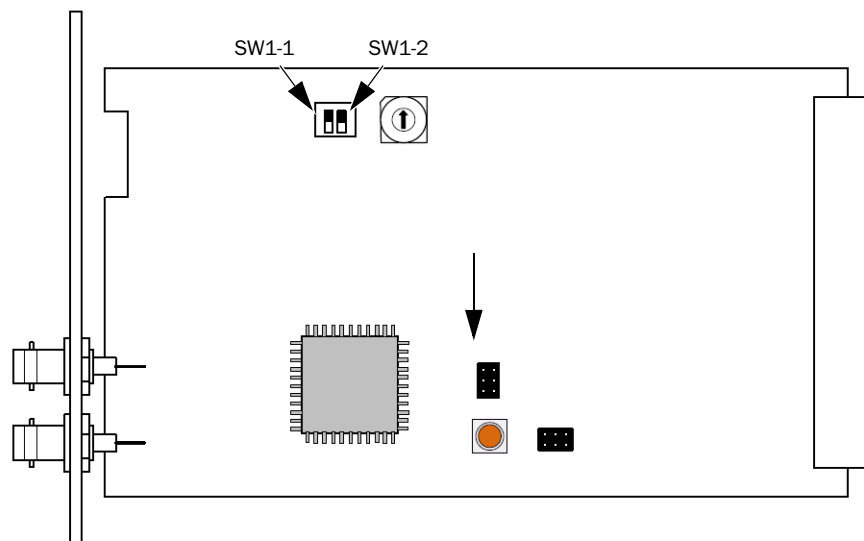
Switch 1 helps configure the MM935's master mode and CAN ID. To set a switch ON, move it to the *up* position.

To set the MM935 to clock master mode, set SW1-1 to ON. Otherwise, set it to OFF.

To initialize all module parameters to factory default values, press the INIT button during power-on.

⚠ To avoid damaging analog circuits, install a master sync source module in a red reserved slot before applying AC power.

💡 To use the MM935 in master mode in the IO93 or IO94 Frames, insert the MM935 into a red reserved slot and remove all other sync modules from the frame.



MM935 installation diagram

Setting the CAN ID

Each frame must be fitted with an FC972 Remote to externally configure all modules (except analog line in/out and WC984) and control mic preamps remotely using a web browser. Install only one FC972 per frame and up to two SY983s (for redundant operation, differentiated by Master/Slave setting).

A Module's system ID consists of the **Frame ID + module CAN ID**. The Frame ID is determined by the FC972's IP Address/Subnet/Host Address. The FC972 must be assigned a unique IP Address based on the frame's role within the system. A CAN ID must be set for each externally controllable module. Most modules have 32 CAN ID settings available but the AD914 Remote Mic Pre-amp has 16.

The FC972 and SY983 have default module CAN IDs that do not interfere with those of other modules. The internal CAN bus must be terminated once per frame, either on the FC972 or SY983.

Using the CAN Address switches on the FC972 or SY983 is an older method of setting the Frame ID. An explicit CAN Address must be set only when employing a hardware CAN-BUS remote controller to configure frames. In System 5, the Frame ID is set with the FC972's IP Address for configuration using a web browser interface.

To set the CAN ID in range 0–15:

- 1 Set SW1-2 to OFF.
- 2 Use the CAN Rotary Switch to set the CAN ID.

To set the CAN ID in range 16–31:

- 1 Set SW1-2 to ON.
- 2 Use the CAN Rotary Switch to set the CAN ID.

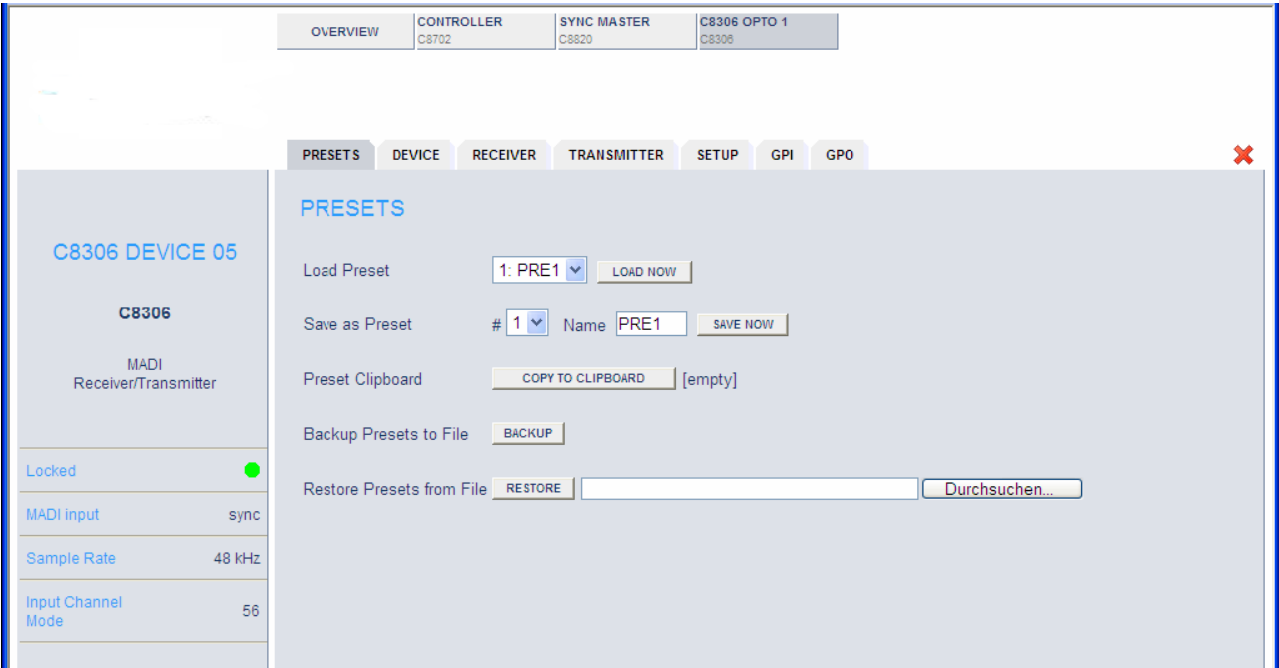
Remote Configuration using a Web Browser

The MM935 is configured using a web browser interface, which requires fitting an FC972 Remote in the frame.

 See “FC972 Remote” on page 35.

PRESET Page

Each Preset includes the parameters of the transmitter and the receiver. Eight User Presets are available which can be changed manually or by GPI.



MM935 Web Configuration Presets page

Load Preset

Selecting a preset from the menu and pressing LOAD NOW loads that preset from the module memory.

Save as Preset

Set a number and name for the preset and press SAVE NOW to save that preset to module memory.

Preset Clipboard

Clicking COPY TO CLIPBOARD copies the active Preset. Using the configuration computer’s clipboard, you can paste this to other modules within a frame.

Backup Presets to File

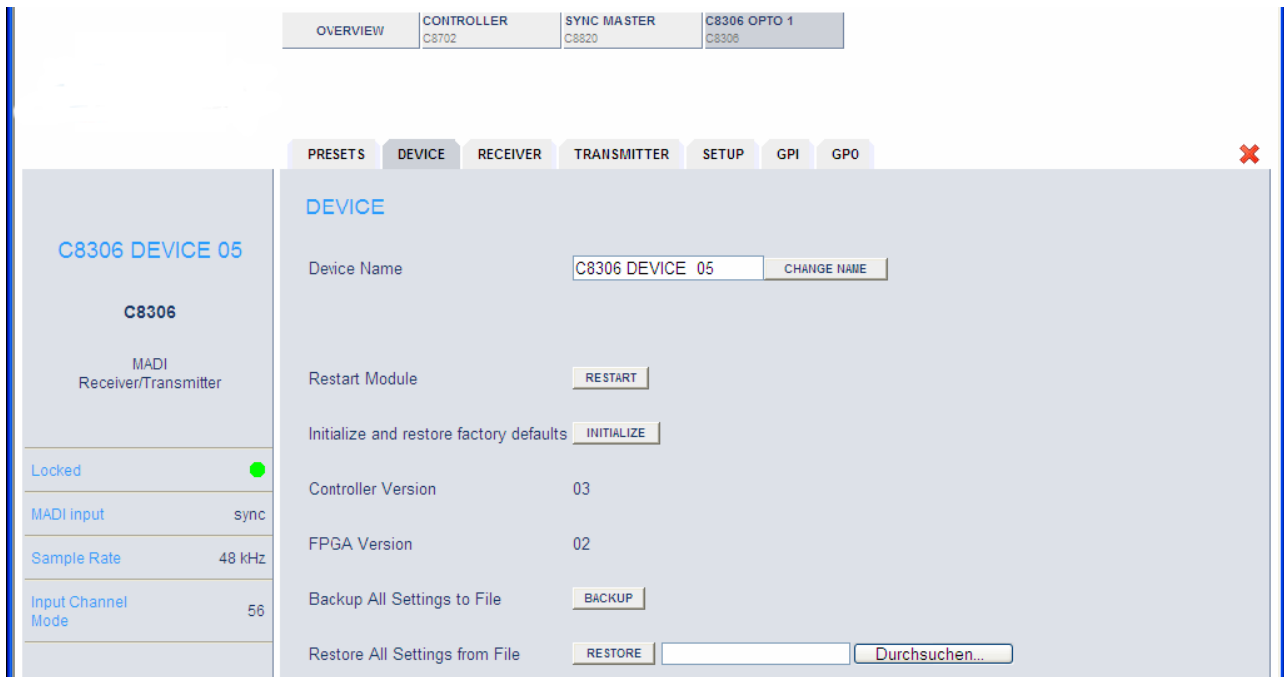
Clicking BACKUP stores all Presets to a file on the configuration computer.

Restore Presets from File

Clicking RESTORE restores all settings from the selected file/destination on the configuration computer.

DEVICE Page

This page sets and displays MM935 parameters.



MM935 Web Configuration Device page

Device Name

This field displays the current name. Clicking CHANGE NAME renames the device.

Restart Module

Clicking RESTART initiates a warm start.

Initialize and restore factory defaults

Clicking INITIALIZE restores factory default settings.

Controller Version

Displays the module’s controller firmware version.

FPGA Version

Displays the module’s FPGA firmware version.

Backup all settings to File

Clicking BACKUP stores all settings to file.

Restore all settings from File

Clicking RESTORE restores all settings from the selected file/destination.

SETUP Page

This page sets up MADI and error processing parameters.

OVERVIEW

CONTROLLER
C8702

SYNC MASTER
C8820

C8306 OPTO 1
C8306

PRESETS

DEVICE

RECEIVER

TRANSMITTER

SETUP

GPI

GPO

C8306 DEVICE 05

C8306

MADI Receiver/Transmitter

Locked

MADI Input sync

Sample Rate 48 kHz

Input Channel Mode 56

SETUP

MADI Bypass

☒ Off
 ☐ Active

MADI Input

☒ Auto
 ☐ Input 1
 ☐ Input 2

Error Processing

☒ Off
 ☐ Active

Error Mask (BUS)

S1

☐

S2

☐

S3

☐

S4

☐

S5

☐

S6

☐

S7

☐

S8

☐

S9

☐

S10

☐

S11

☐

S12

☐

S13

☐

S14

☐

S15

☐

S16

☐

S17

☐

S18

☐

S19

☐

S20

☐

S21

☐

S22

☐

S23

☐

S24

☐

S25

☐

S26

☐

S27

☐

S28

☐

S29

☐

S30

☐

S31

☐

S32

☐

MM935 Web Configuration Setup page

MADI Bypass

Selecting Active bypasses MADI processing.

MADI Input

No function in this module.

Error Processing

Used for remote system monitoring. Select Active to enable global bus error detection.

Error Mask (BUS)

Selecting these turns on error detection for individual busses (S1–S32).

⚡ *Error detection must be turned OFF for busses not in use to prevent bad module status message.*

RECEIVERS Page

This page routes MADI input signals to the frame’s audio busses.

OVERVIEWCONTROLLERC8702SYNC MASTERC8820C8306 OPTO 1C8306

PRESETSDEVICERECEIVERTRANSMITTERSETUPGPIGPO

C8306 DEVICE 05

C8306

MADI Receiver/Transmitter

Locked

MADI input sync

Sample Rate 48 kHz

Input Channel Mode 64

RECEIVER

MADI Receiver Status: LOCKChannel Mode: 64

MADI Input Channel to C8000 Bus Routing

8 Channel Mode (TDM)

BUS

IN 1..8

OFF

IN 9..16

OFF

IN 17..24

OFF

IN 25..32

OFF

IN 33..40

OFF

IN 41..48

OFF

IN 49..56

OFF

IN 57..64

OFF

BUS

IN 1/2

OFF

IN 9/10

OFF

IN 17/18

OFF

IN 25/26

OFF

IN 33/34

OFF

IN 41/42

OFF

IN 49/50

OFF

IN 57/58

OFF

BUS

IN 3/4

OFF

IN 11/12

OFF

IN 19/20

OFF

IN 27/28

OFF

IN 35/36

OFF

IN 43/44

OFF

IN 51/52

OFF

IN 59/60

OFF

BUS

IN 5/6

OFF

IN 13/14

OFF

IN 21/22

OFF

IN 29/30

OFF

IN 37/38

OFF

IN 45/46

OFF

IN 53/54

OFF

IN 61/62

OFF

BUS

IN 7/8

OFF

IN 15/16

OFF

IN 23/24

OFF

IN 31/32

OFF

IN 39/40

OFF

IN 47/48

OFF

IN 55/56

OFF

IN 63/64

OFF

☐ Enable C8000 Bus Driver

MM935 Web Configuration Receivers page

8 Channel Mode (TDM)

Groups of eight adjacent MADI input channels can be routed to a single audio bus (S1–S32) or OFF.

2 Channel Mode

Pairs of adjacent MADI input channels can be routed to a single audio bus (S1–S32) or OFF.

Enable C8000 Bus Driver

Selecting this option enables all 32 bus drivers. Make sure there is no conflict with other modules occupying the same bus line before enabling.

 Only one output can be connected to one bus. Busses not in use should be set to OFF.

TRANSMITTERS Page

This page connects the frame’s audio busses to MADI outputs.

OVERVIEW

CONTROLLER
C8702

SYNC MASTER
C8820

C8306 OPTO 1
C8306

PRESETS

DEVICE

RECEIVER

TRANSMITTER

SETUP

GPI

GPO

C8306 DEVICE 05

C8306

MADI Receiver/Transmitter

Locked

MADI input sync

Sample Rate 48 kHz

Input Channel Mode 64

TRANSMITTER

Number of channels ☐ 56 ☒ 64

C8000 Bus to MADI Output Channel Routing

8 Channel Mode (TDM)

BUS

☐ OFF

OUT 1..8

BUS

☐ OFF

OUT 9..16

BUS

☐ OFF

OUT 17..24

BUS

☐ OFF

OUT 25..32

BUS

☐ OFF

OUT 33..40

BUS

☐ OFF

OUT 41..48

BUS

☐ OFF

OUT 49..56

BUS

☐ OFF

OUT 57..64

2 Channel Mode

BUS

☐ S1

OUT 1/2

BUS

☐ S5

OUT 9/10

BUS

☐ S9

OUT 17/18

BUS

☐ S13

OUT 25/26

BUS

☐ S17

OUT 33/34

BUS

☐ S21

OUT 41/42

BUS

☐ S25

OUT 49/50

BUS

☐ OFF

OUT 57/58

BUS

☐ S2

OUT 3/4

BUS

☐ S6

OUT 11/12

BUS

☐ S10

OUT 19/20

BUS

☐ S14

OUT 27/28

BUS

☐ S18

OUT 35/36

BUS

☐ S22

OUT 43/44

BUS

☐ S26

OUT 51/52

BUS

☐ OFF

OUT 59/60

BUS

☐ S3

OUT 5/6

BUS

☐ S7

OUT 13/14

BUS

☐ S11

OUT 21/22

BUS

☐ S15

OUT 29/30

BUS

☐ S19

OUT 37/38

BUS

☐ S23

OUT 45/46

BUS

☐ S27

OUT 53/54

BUS

☐ OFF

OUT 61/62

BUS

☐ S4

OUT 7/8

BUS

☐ S8

OUT 15/16

BUS

☐ S12

OUT 23/24

BUS

☐ S16

OUT 31/32

BUS

☐ S20

OUT 39/40

BUS

☐ S24

OUT 47/48

BUS

☐ S28

OUT 55/56

BUS

☐ OFF

OUT 63/64

MM935 Web Configuration Transmitters page

Number of Channels

The number of audio channels per MADI stream can be set to 56 or 64. Ensure the equipment connected is set to the same number.

8 Channel Mode (TDM)

An audio bus (S1–32) can be connected to a group of eight adjacent MADI output channels. Ensure the source signal on the audio bus is also set to 8 Channel Mode.

2 Channel Mode

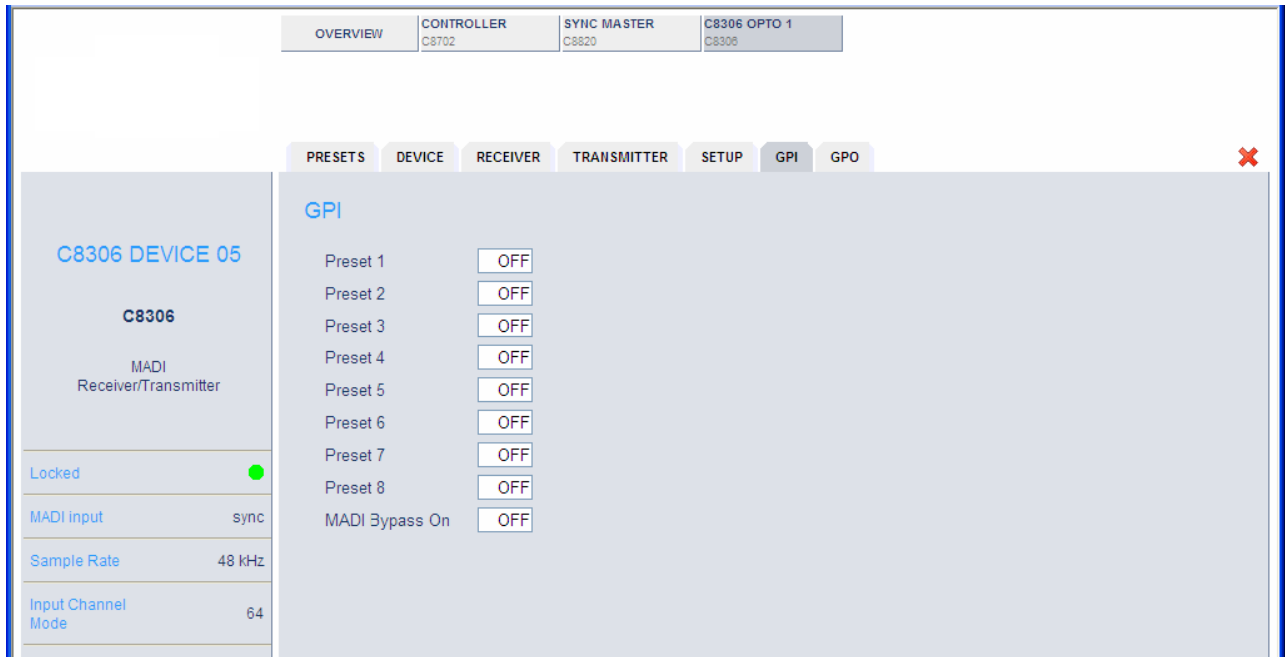
An audio bus (S1–32) can be connected to a group of two adjacent MADI output channels. Ensure the source signal on the audio bus is also set to 2 Channel Mode.

GPI Page

This page sets up frame-wide GPI numbers to trigger dedicated module functions.

If a GPIO system module detects a GPI input, it puts the associated GPI number on the CAN bus. Each frame module watches for these GPI numbers and performs the programmed action if it reads that number on the CAN bus.

 Do not assign the same GPIO numbers to different functions because this incorrectly triggers multiple functions.



MM935 Web Configuration GPI page

Preset 1–8

A GPI input can be entered to trigger a preset recall.

MADI Bypass On

Set a GPI input can be entered to trigger MADI Bypass On (MADI In to MADI out) bypassing the MADI routing.

GPO Page

This page sets up frame-wide GPO numbers to trigger a dedicated GPO (Tally) of a GPIO module.

OVERVIEW	CONTROLLER C8702	SYNC SLAVE C8830	4CH LEVELMAGIC C8048	AM RADIO 1-8 C8081	C8305 BNC C8305	C8501
	SYNC MASTER C8830	BCH MATRIX: C8080	AUDIO FAIL CTRL C8020	FM RADIO MADRID C8007	4X MIC-LINE IN C8234	

C8305 BNC

C8305

MADI Receiver/Transmitter

Preset

modified: PRE7

Locked

Received Audio

n/a

Sample Rate

n/a

Input Channel Mode

n/a

Transmitter Input Bus Error

GPO

Preset 1

OFF

Preset 2

OFF

Preset 3

OFF

Preset 4

OFF

Preset 5

OFF

Preset 6

OFF

Preset 7

OFF

Preset 8

OFF

MADI Bypass On

OFF

Lock

OFF

MM935 Web Configuration GPO page

💡 Do not assign the same GPIO numbers to different functions because this incorrectly triggers multiple functions.

Preset 1–8

A GPO output can be entered that triggers when a Preset is recalled.

MADI Bypass On

A GPO output can be entered that triggers when MADI Bypass On is enabled.

Lock

A GPO output can be entered that triggers when the module is sync locked.

Technical Specifications

MADI Interface

Standard	AES 10 (2003)
Connection	75 Ω BNC
Signal Level	800 mV $\pm$ 10%
Audio Data Format	24-bit transparent for C- and U-Bit according to AES3
Audio Sample Rate	48 kHz: 64 channels 96 kHz: 32 channels

General Specifications

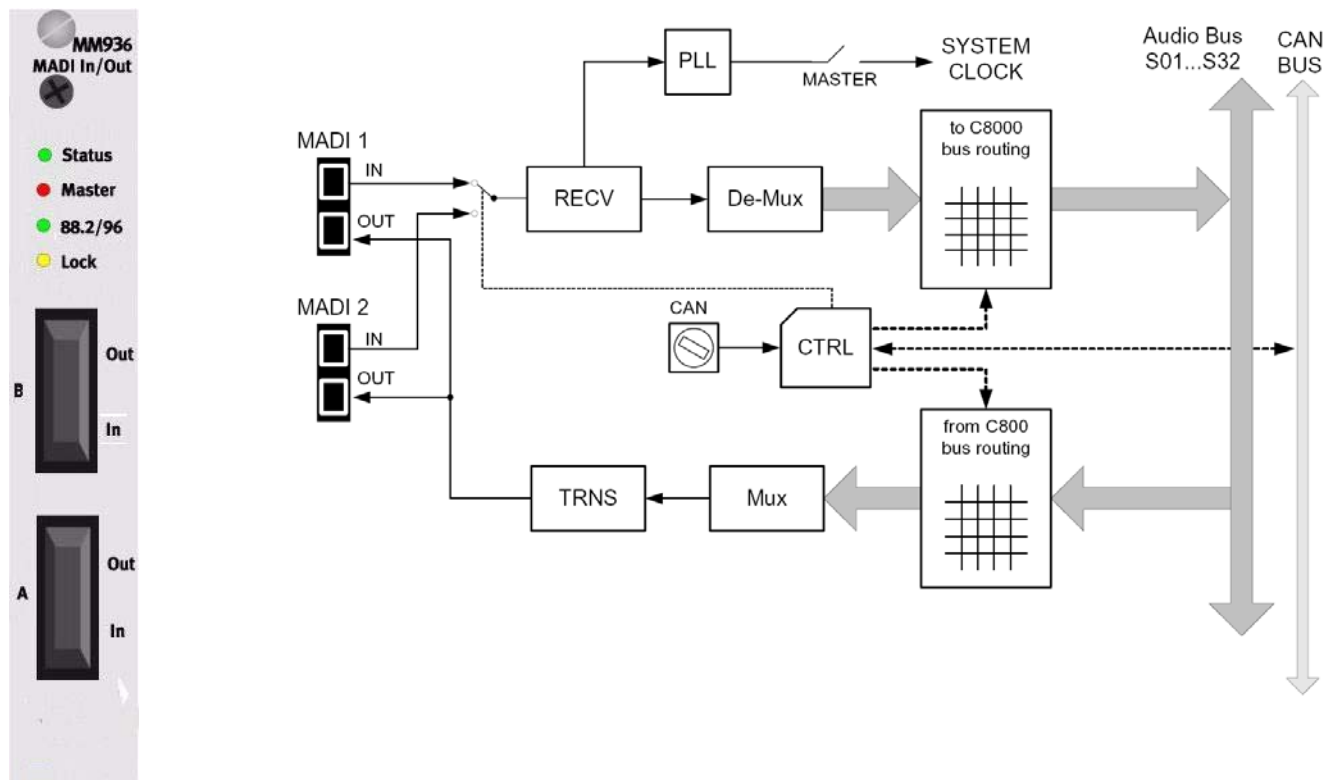
Backplane Connector	DIN41612, 64-pin, a+b, male
Power Supply	+5 VDC
Consumption	~360 mA
Dimensions	3 RU, 4 HP (1 slot)
Ambient	10°C to 40°C
Humidity	90%, non-condensing

MM936 MADI In/Out (Redundant Fiber)

The MM936 is an I/O interface for MADI multichannel audio signals.

Features

- Optical receiver and transmitter
- Redundant connections
- Extended mode: 64 channels @ 48 kHz
- High sampling mode: 32 channels @ 96 kHz
- 24-bit word length
- In Master mode, frame locks to MADI input without requiring an SY983 Sync module
- Full crosspoint matrix configuration/setup using a web browser interface
- Automatic fail-over switch from IN1 to IN2



MM936 front panel (left) and block diagram (right)

Installation Considerations

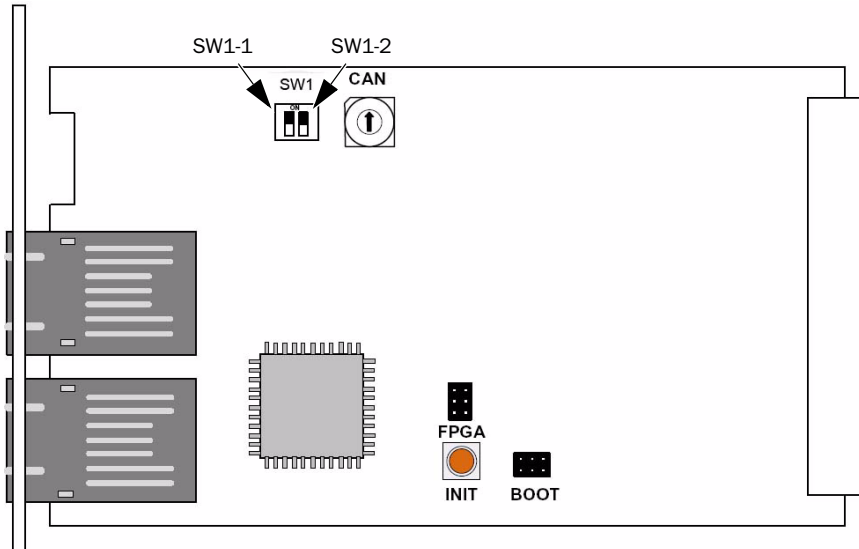
SW1 helps configure the MM936's master mode and CAN ID. To set a switch ON, move it to the *up* position.

To set the MM936 to clock master mode, set SW1-1 to ON. Otherwise, set it to OFF.

To initialize all module parameters to factory default values, press the INIT button during power-on.

 *To avoid damaging analog circuits, install a master sync source module in a red reserved slot before applying AC power.*

 *To use the MM936 in master mode in the IO93 or IO94 Frames, insert the MM936 into a red reserved slot and remove all other sync modules from the frame.*



MM936 installation diagram

Setting the CAN ID

Each frame must be fitted with an FC972 Remote to externally configure all modules (except analog line in/out and WC984) and control mic preamps remotely using a web browser. Install only one FC972 per frame and up to two SY983s (for redundant operation, differentiated by Master/Slave setting).

A Module's system ID consists of the **Frame ID + module CAN ID**. The Frame ID is determined by the FC972's IP Address/Subnet/Host Address. The FC972 must be assigned a unique IP Address based on the frame's role within the system. A CAN ID must be set for each externally controllable module. Most modules have 32 CAN ID settings available but the AD914 Remote Mic Pre-amp has 16.

The FC972 and SY983 have default module CAN IDs that do not interfere with those of other modules. The internal CAN bus must be terminated once per frame, either on the FC972 or SY983.

Using the CAN Address switches on the FC972 or SY983 is an older method of setting the Frame ID. An explicit CAN Address must be set only when employing a hardware CAN-BUS remote controller to configure frames. In System 5, the Frame ID is set with the FC972's IP Address for configuration using a web browser interface.

To set the CAN ID in range 0–15:

- 1 Set SW1-2 to OFF.
- 2 Use the CAN Rotary Switch to set the CAN ID.

To set the CAN ID in range 16–31:

- 1 Set SW1-2 to ON.
- 2 Use the CAN Rotary Switch to set the CAN ID.

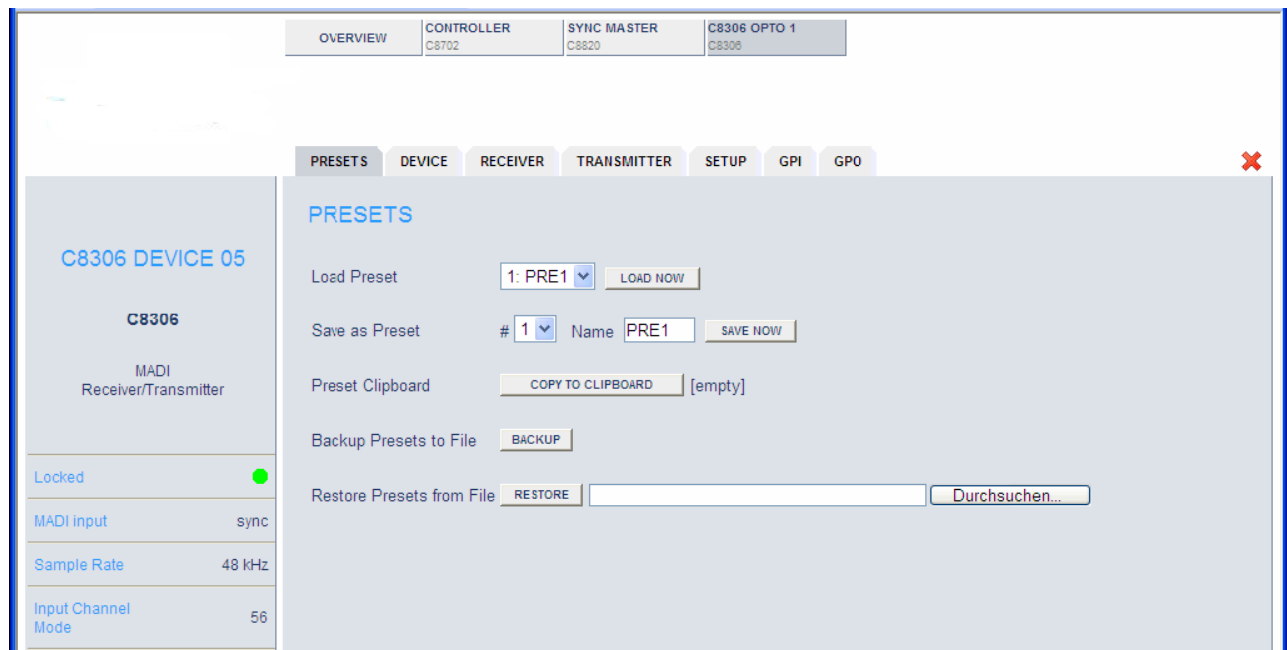
Remote Configuration using a Web Browser

The MM936 is configured using a web browser interface, which requires fitting an FC972 Remote in the frame.

 See “FC972 Remote” on page 35.

PRESET Page

Each Preset includes the parameters of the transmitter and the receiver. Eight User Presets are available which can be changed manually or by GPI.



MM936 Web Configuration Presets page

Load Preset

Selecting a preset from the menu and pressing LOAD NOW loads that preset from the module memory.

Save as Preset

Setting a number and name for the preset and pressing SAVE NOW saves that preset to module memory.

Preset Clipboard

Clicking COPY TO CLIPBOARD copies the active Preset. Using the configuration computer’s clipboard, you can paste this to other modules within a frame.

Backup Presets to File

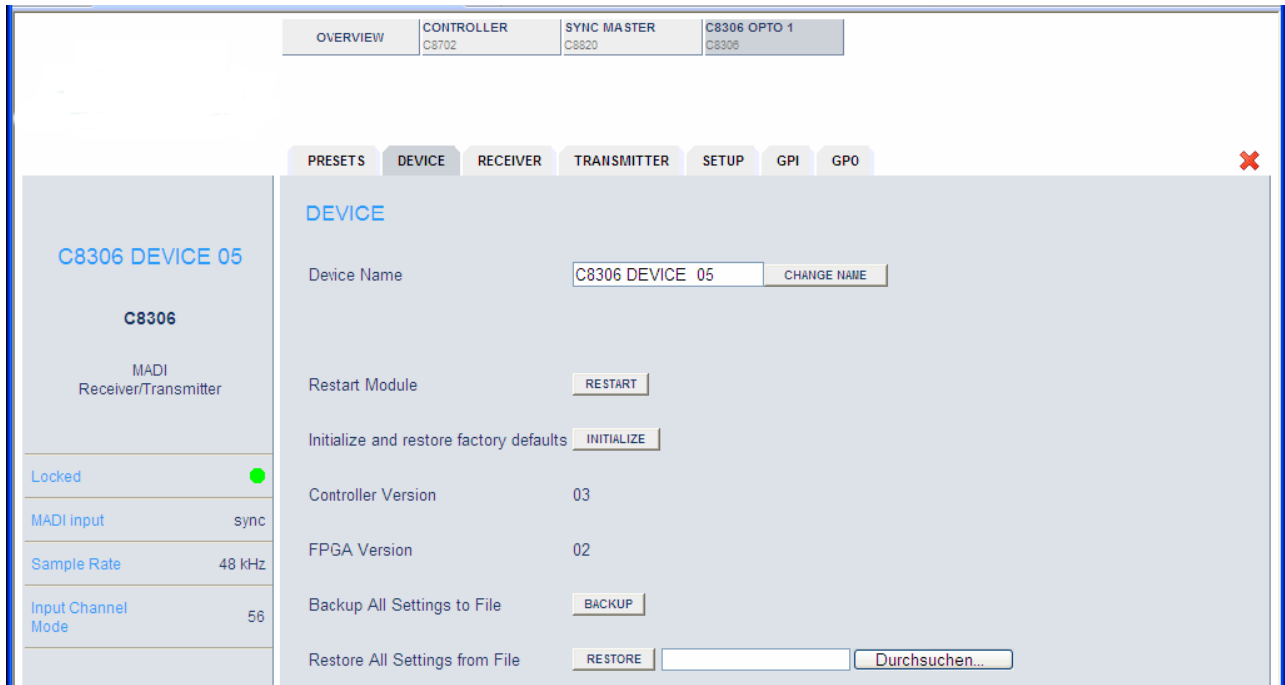
Clicking BACKUP store all Presets to a file on the configuration computer.

Restore Presets from File

Clicking RESTORE restores all settings from the selected file/destination on the configuration computer.

DEVICE Page

This page manages basic settings for the MM935.



MM936 Web Configuration Device page

Device Name

This field displays the current name. Click CHANGE NAME to rename the device.

Restart Module

Clicking RESTART initiates a warm start.

Initialize and restore factory defaults

Clicking INITIALIZE restores factory default settings.

Controller Version

This displays the module’s controller firmware version.

FPGA Version

This displays the module’s FPGA firmware version.

Backup all settings to File

Clicking BACKUP stores all settings to file.

Restore all settings from File

Clicking RESTORE restores all settings from the selected file/destination.

SETUP Page

This page sets up MADI and error processing parameters.

OVERVIEW

CONTROLLER
C8702

SYNC MASTER
C8820

C8306 OPTO 1
C8306

PRESETS

DEVICE

RECEIVER

TRANSMITTER

SETUP

GPI

GP0

C8306 DEVICE 05

C8306

MADI Receiver/Transmitter

Locked

MADI inputsync

Sample Rate48 kHz

Input Channel Mode56

SETUP

MADI Bypass

OffActive

MADI Input

AutoInput 1Input 2

Error Processing

OffActive

Error Mask (BUS)

S1

S2

S3

S4

S5

S6

S7

S8

S9

S10

S11

S12

S13

S14

S15

S16

S17

S18

S19

S20

S21

S22

S23

S24

S25

S26

S27

S28

S29

S30

S31

S32

MM936 Web Configuration Setup page

MADI Bypass

Selecting Active bypasses MADI processing.

MADI Input

Selecting Input 1 or Input 2 manually activates that input.

Selecting Auto automatically switches over from Input 1 to Input 2 if Input 1 fails due to loss of signal.

Error Processing

This is used for remote system monitoring. Select Active to enable bus error detection.

Error Mask (BUS)

This turns on error detection for individual busses (S1–S32)

 Error detection must be turned OFF for busses not in use to prevent bad module status message.

RECEIVERS Page

This page routes MADI input signals to the frame’s audio busses.

OVERVIEWCONTROLLERC8702SYNC MASTERC8820C8306 OPTO 1C8306

PRESETSDVICERECEIVERTRANSMITTERSETUPGPIGPO

C8306 DEVICE 05

C8306

MADI Receiver/Transmitter

Locked

MADI inputsync

Sample Rate48 kHz

Input Channel Mode64

RECEIVER

MADI Receiver Status: LOCK

Channel Mode: 64

MADI Input Channel to C8000 Bus Routing

8 Channel Mode (TDM)		2 Channel Mode	
BUS		BUS	
IN 1..8	OFF	IN 1/2	OFF
IN 9..16	OFF	IN 3/4	OFF
IN 17..24	OFF	IN 5/6	OFF
IN 25..32	OFF	IN 7/8	OFF
IN 33..40	OFF	IN 9/10	OFF
IN 41..48	OFF	IN 11/12	OFF
IN 49..56	OFF	IN 13/14	OFF
IN 57..64	OFF	IN 15/16	OFF
		IN 17/18	OFF
		IN 19/20	OFF
		IN 21/22	OFF
		IN 23/24	OFF
		IN 25/26	OFF
		IN 27/28	OFF
		IN 29/30	OFF
		IN 31/32	OFF
		IN 33/34	OFF
		IN 35/36	OFF
		IN 37/38	OFF
		IN 39/40	OFF
		IN 41/42	OFF
		IN 43/44	OFF
		IN 45/46	OFF
		IN 47/48	OFF
		IN 49/50	OFF
		IN 51/52	OFF
		IN 53/54	OFF
		IN 55/56	OFF
		IN 57/58	OFF
		IN 59/60	OFF
		IN 61/62	OFF
		IN 63/64	OFF

☐ Enable C8000 Bus Driver

MM936 Web Configuration Receivers page

8 Channel Mode (TDM)

A group of 8 adjacent MADI input channels can be routed to a single audio bus (S1–S32) or OFF.

2 Channel Mode

Pairs of adjacent MADI input channels can be routed to a single audio bus (S1–S32) or OFF.

Enable C8000 Bus Driver

Selecting this option enables all 32 bus drivers. Make sure there is no conflict with other modules occupying the same bus line before enabling.

 Only one output can be connected to one bus. Busses not in use should be set to OFF.

TRANSMITTERS Page

This page connects the frame’s audio busses to MADI outputs.

OVERVIEWCONTROLLER C8702SYNC MASTER C8820C8306 OPTO 1 C8306

PRESETSDEVICERECEIVERTRANSMITTERSETUPGPIGPO

C8306 DEVICE 05

C8306

MADI Receiver/Transmitter

Locked

MADI input sync

Sample Rate 48 kHz

Input Channel Mode 64

TRANSMITTER

Number of channels 5664

C8000 Bus to MADI Output Channel Routing

8 Channel Mode (TDM)

BUS

OFF

OUT 1..8

OFF

OUT 9..16

OFF

OUT 17..24

OFF

OUT 25..32

OFF

OUT 33..40

OFF

OUT 41..48

OFF

OUT 49..56

OFF

OUT 57..64

2 Channel Mode

BUS

S1

OUT 1/2

S5

OUT 9/10

S9

OUT 17/18

S13

OUT 25/26

S17

OUT 33/34

S21

OUT 41/42

S25

OUT 49/50

OFF

OUT 57/58

BUS

S2

OUT 3/4

S6

OUT 11/12

S10

OUT 19/20

S14

OUT 27/28

S18

OUT 35/36

S22

OUT 43/44

S26

OUT 51/52

OFF

OUT 59/60

BUS

S3

OUT 5/6

S7

OUT 13/14

S11

OUT 21/22

S15

OUT 29/30

S19

OUT 37/38

S23

OUT 45/46

S27

OUT 53/54

OFF

OUT 61/62

BUS

S4

OUT 7/8

S8

OUT 15/16

S12

OUT 23/24

S16

OUT 31/32

S20

OUT 39/40

S24

OUT 47/48

S28

OUT 55/56

OFF

OUT 63/64

MM936 Web Configuration Transmitters page

Number of Channels

Sets the number of audio channels per MADI stream to 56 or 64. Ensure the equipment connected is set to the same number.

8 Channel Mode (TDM)

An audio bus (S1–32) can be routed to a group of 8 adjacent MADI output channels. Ensure the source signal on the audio bus is also set to 8 Channel Mode.

2 Channel Mode

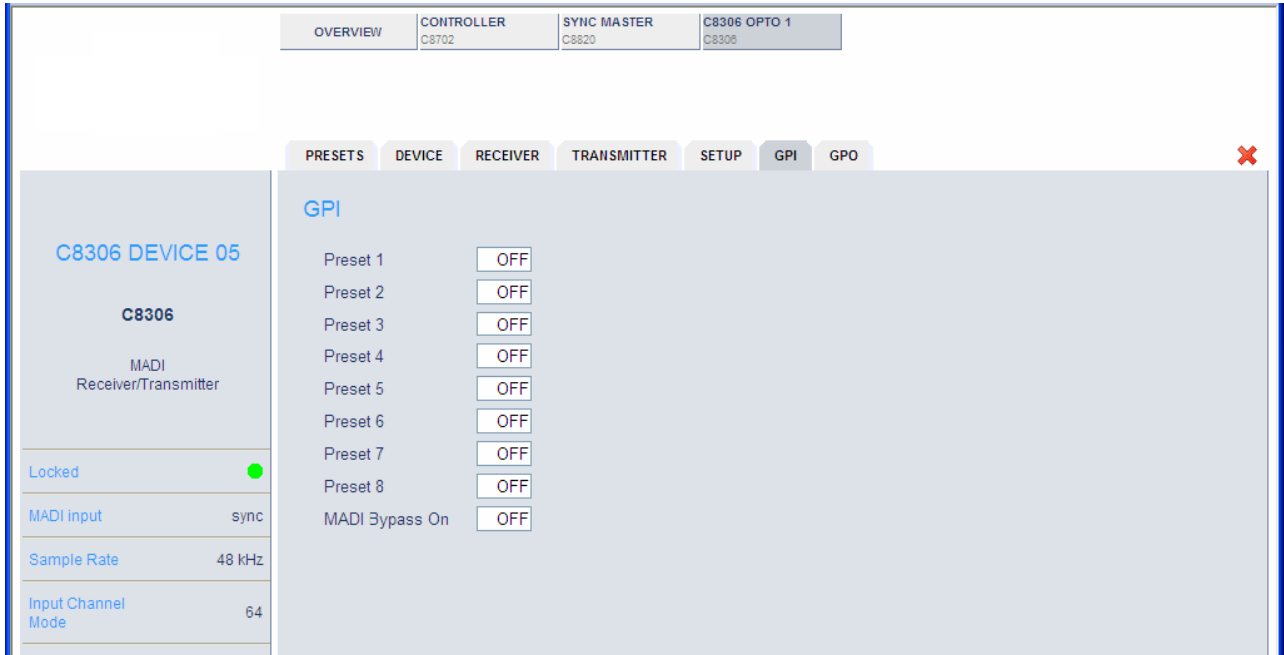
An audio bus (S1–32) can be routed to a group of 2 adjacent MADI output channels. Ensure the source signal on the audio bus is also set to 2 Channel Mode.

GPI Page

This page sets up frame-wide GPI numbers to trigger dedicated module functions.

If a GPIO system module detects a GPI input, it puts the associated GPI number on the CAN bus. Each frame module watches for these GPI numbers and performs the pre-programmed action if it reads that number on the CAN bus.

 Do not assign the same GPIO numbers to different functions because this incorrectly triggers multiple functions.



MM936 Web Configuration GPI page

Preset 1–8

A GPI input can be entered to trigger a preset recall.

MADI Bypass On

A GPI input can be entered to trigger MADI Bypass On (MADI In to MADI out) bypassing the MADI routing.

GPO Page

This page sets up frame-wide GPO numbers to trigger a dedicated GPO (Tally) of a GPIO module.

OVERVIEW#

CONTROLLER	C8702	SYNC SLAVE	C8830	4CH LEVELMAGIC	C8048	AM RADIO 1-8	C8081	C8305 BNC	C8305	C8501
SYNC MASTER	C8830	8CH MATRIX:	C8080	AUDIO FAIL CTRL	C8020	FM RADIO MADRID	C8007	4X MIC-LINE IN	C8234	

PRESETS

DEVICE

RECEIVER

TRANSMITTER

SETUP

GPI

GPO

C8305 BNC

C8305

MADI Receiver/Transmitter

Presetmodified: PRE7

Locked

Received Audion/a

Sample Rate

Input Channel Moden/a

Transmitter Input Bus Error

GPO

Preset 1

OFF

Preset 2

OFF

Preset 3

OFF

Preset 4

OFF

Preset 5

OFF

Preset 6

OFF

Preset 7

OFF

Preset 8

OFF

MADI Bypass On

OFF

Lock

OFF

MM936 Web Configuration GPO page

💡 Do not assign the same GPIO numbers to different functions because this incorrectly triggers multiple functions.

Preset 1–8

A GPO output can be entered to trigger when a Preset is recalled.

MADI Bypass On

A GPO output can be entered to trigger when MADI Bypass On is enabled.

Lock

A GPO output can be entered to trigger when the module is sync locked.

Technical Specifications

MADI Interface

Standard	AES 10 (2003)
Connections	SC duplex x2 62.5/125 micrometer multimode
Signal	1310 nm multimode
Audio Data Format	24-bit transparent for C- and U-Bit according to AES3
Audio Sample Rate	48 kHz: 64 channels 96 kHz: 32 channels

General Specifications

Backplane Connector	DIN41612, 64-pin, a+b, male
Power Supply	+5 VDC
Consumption	~360 mA
Dimensions	3 RU, 4 HP (1 slot)
Ambient	10°C to 40°C
Humidity	90%, non-condensing

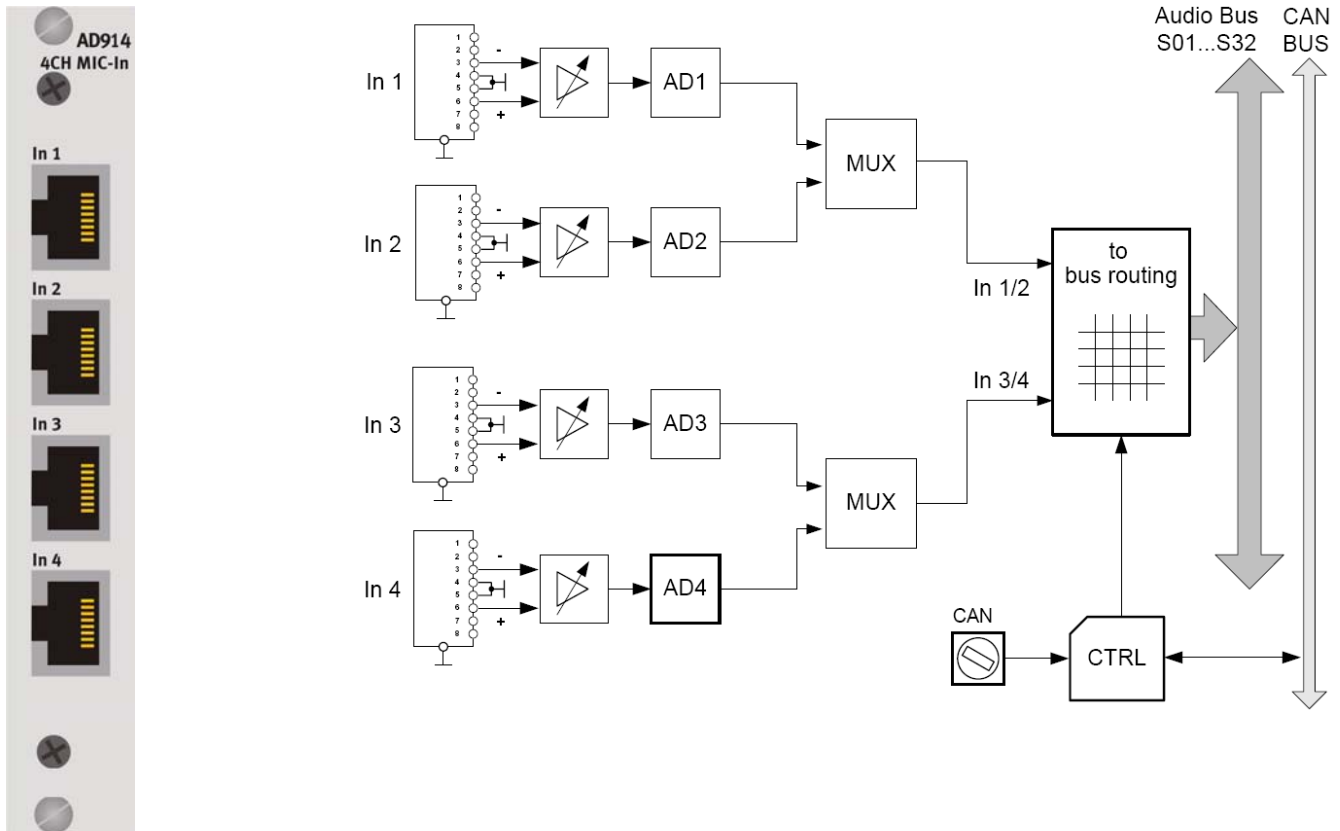
Chapter 9: Mic/Line Analog Modules

AD914 4ch MIC-In

The AD914 is a four-channel microphone input interface.

Features

- A/D-converter: 24-bit sigma-delta
- Maximum sample rate: 96 kHz
- Digital gain control: 0–65 dB
- Maximum line input level: +20 dBu
- Pad attenuation: -10 dB
- Floating balanced analog inputs
- Electrical isolation between channels
- 48-V phantom power
- Remote operation using EUCON or web browser

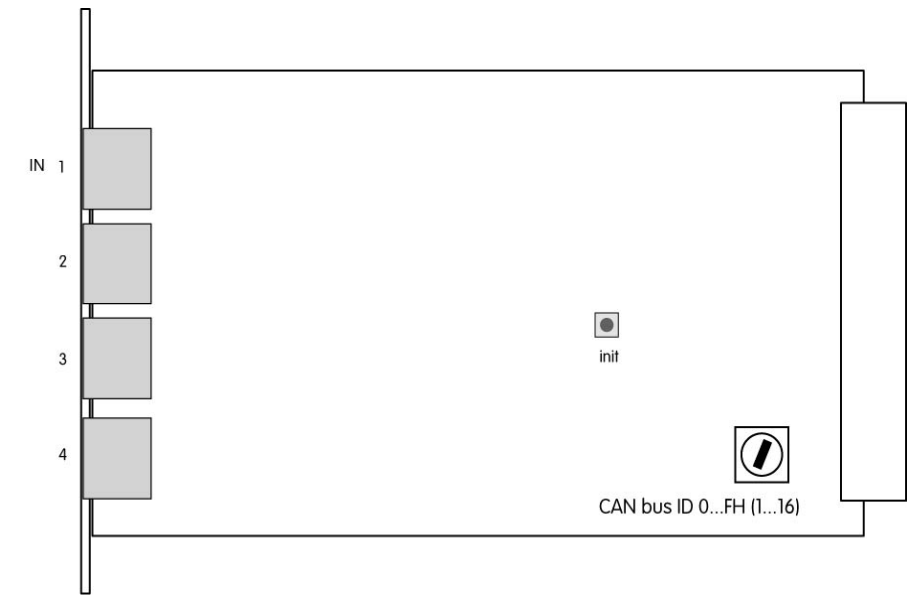


AD914 front panel (left) and block diagram (right)

Installation Considerations

To initialize all module parameters to factory default values, press the INIT button during power-on.

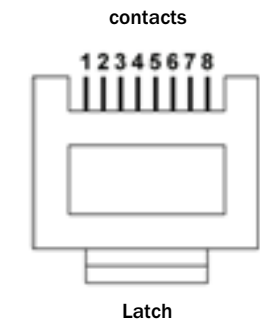
⚠ To avoid damaging analog circuits, install a master sync source module in a red reserved slot before applying AC power.



AD914 installation diagram

RJ45 Connector Wiring

Signal	+	GND	-
Input	3	4, 5	6



RJ45 cable shown from cable entry side

Configuration for Console Control

The AD914 is controlled by System 5 and Max Air consoles by connecting the frame's FC972 Remote network port to the System 5/Max Air network switch. Mic settings (gain, +48 V, high-pass filter, etc.) are controlled from the console surface. Settings are saved to console Title files and recalled when a Title is loaded.

For proper console mic control, you must use the correct frame address which is determined by the IP Address of the installed FC972 remote. The following table shows addresses used by the system. The FC972 network Gateway setting is 192.168.0.1 in all cases (the address of the console's System Computer).

Console Mic Control Port	TCC (ML530)	Frame IP Address
Mic Control Port 1	TCC2	192.168.0.150/255.255.255.0
Mic Control Port 2	TCC3	192.168.0.151/255.255.255.0
Mic Control Port 3	TCC4	192.168.0.152/255.255.255.0
Mic Control Port 4	TCC5	192.168.0.153/255.255.255.0
Mic Control Port 5	TCC6	192.168.0.154/255.255.255.0
Mic Control Port 6	TCC7	192.168.0.155/255.255.255.0
Mic Control Port 7	TCC8	192.168.0.156/255.255.255.0



Console mic control ports may be used by any combination of Modular I/O Mic Pre frames or ML530 Mic-Line Interfaces (controlled with a TCC serial control interface). Do not double-assign a mic control port by connecting an ML530 to a TCC control line and a Modular Frame addressed to that port's equivalent IP Address. For more information about TCC control, see the System 5 or Max Air Guides.

AD914 CAN IDs

A Modular I/O frame employs the CAN-bus for internal communication and remote control. For proper operation each module in the frame must have a unique CAN ID. Use the CAN Rotary Switch to set the CAN ID in range 0–16.

AD914 Mic Pres CAN IDs should be set starting from the lowest address and continuing upwards without gaps. The CAN ID of the module determines the mic preamp's position within the Console Control Port:

CAN ID	Mic #s	CAN ID	Mic #s
0	1–4	8	33–36
1	5–8	9	37–40
2	9–12	10	41–44
3	13–16	11	45–48
4	17–20	12	49–52
5	21–24	13	53–56
6	25–28	14	57–60
7	29–32	15	61–64



Although 64 mic preamps can be controlled in a single frame, be careful not to overload the frame's PSU capacity.

Cabling

The console Cabling feature maps a console's mic preamp control port to the MADI input at which the mic's audio appears. This means that the audio from a mic patched into an audio channel appears at that channel's input along with relevant preamp controls on the channel's strip.

 *For more information on Cabling, see the System 5 or Max Air Guides.*

An ML530 Mic-Line Interface connects to a console mic control port using a TCC serial connection. When the ML530 is cabled to the MADI port, MADI sources 1–24 are mapped to the mic control port positions 1–24.

A Modular I/O frame connects to a console mic control port by addressing the FC972 Remote to the correct IP Address (see “Configuration for Console Control” on page 89) and connecting it to the console's network switch.

When a Modular Mic frame is cabled to a MADI port, control mapping is applied to only those sources where an AD914 has been detected. Before configuring the Cabling feature, ensure the Frame is online and detected by the system.

For example, in a Modular I/O frame with three AD914s (CAN IDs 0, 1, 2), only mic control port positions 1–12 are mapped. A frame with 12 AD914s (CAN IDs 0–11) maps mic control port positions 1–48.

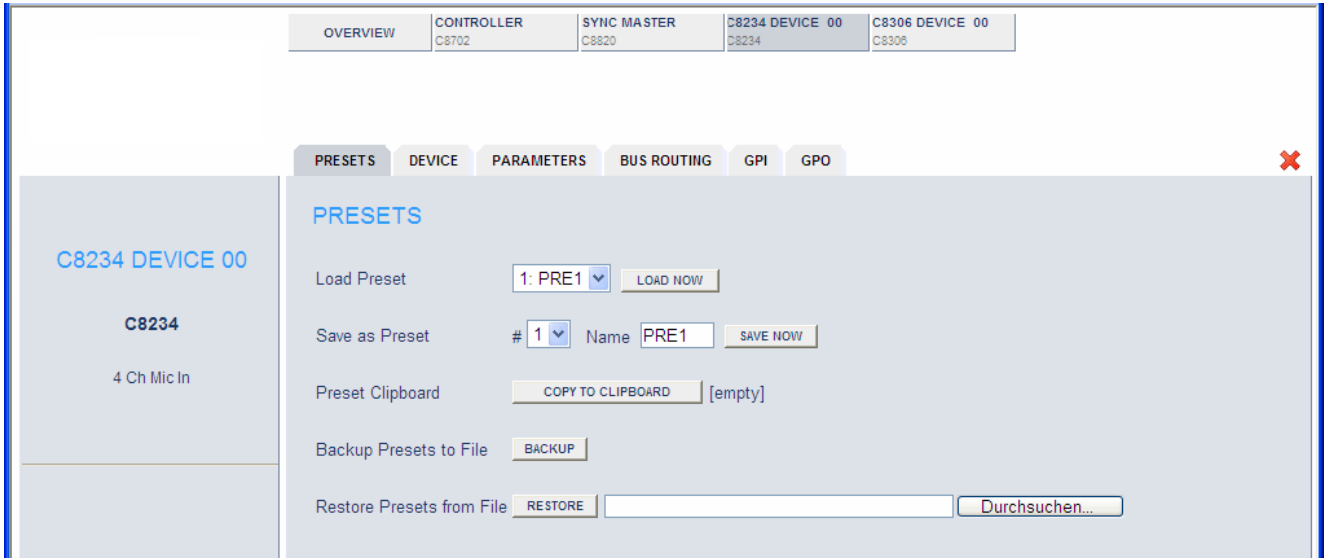
Remote Configuration using a Web Browser

The MM936 is configured using a web browser interface, which requires fitting an FC972 Remote in the frame.

 See “FC972 Remote” on page 35.

PRESET Page

Each Preset includes the parameters of the transmitter and the receiver. There are eight User Presets, each can be changed manually or by GPI.



AD914 Web Configuration Presets page

Load Preset

Selecting a preset from the menu and pressing LOAD NOW loads that preset from the module memory.

Save as Preset

Setting a number and name for the preset and pressing SAVE NOW saves that preset to module memory.

Preset Clipboard

Clicking COPY TO CLIPBOARD copies the active Preset. You can use the configuration computer’s clipboard to paste this to other frame modules.

Backup Presets to File

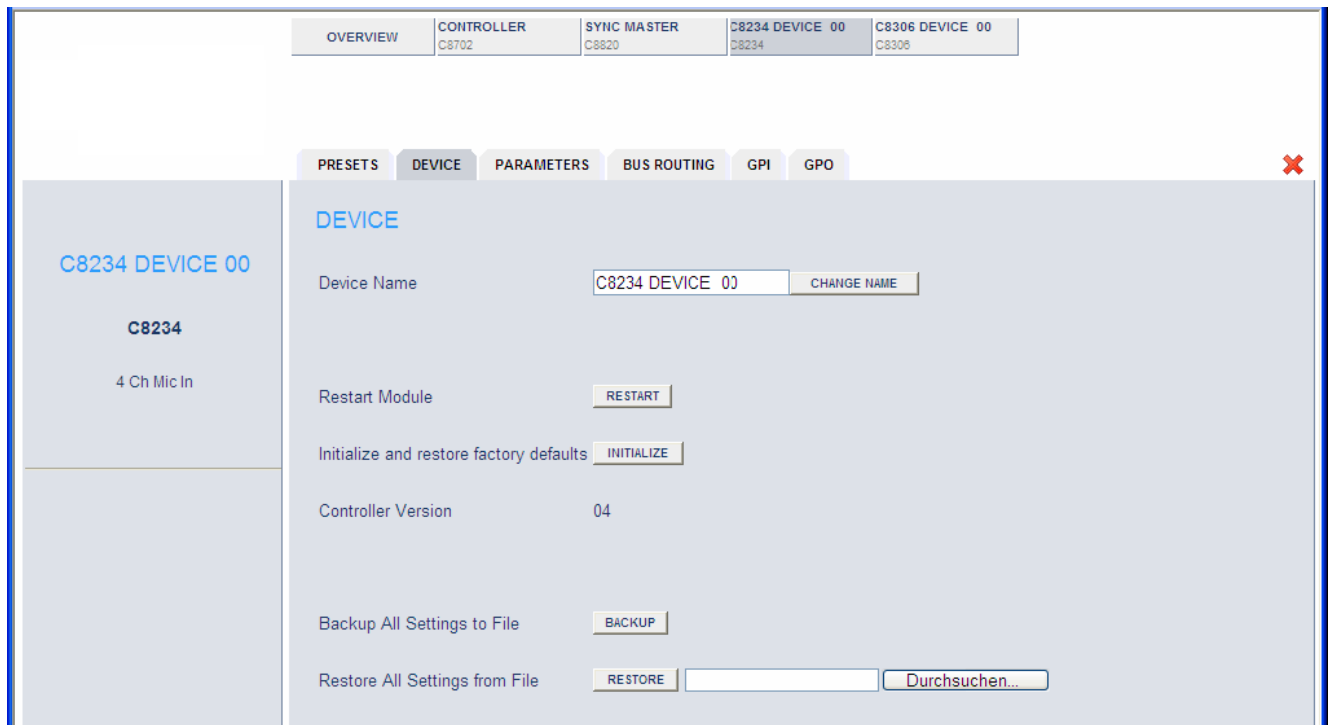
Clicking BACKUP stores all Presets to a file on the configuration computer.

Restore Presets from File

Clicking RESTORE restores all settings from the selected file/destination on the configuration computer.

DEVICE Page

This page configures device-specific parameters of the AD914.



AD914 Web Configuration Device page

Device Name

This field displays the current name. Click CHANGE NAME to rename the device.

Restart Module

Clicking RESTART initiates a warm start.

Initialize and restore factory defaults

Clicking INITIALIZE restores factory default settings.

Controller Version

This displays the module’s firmware version.

Backup all settings to File

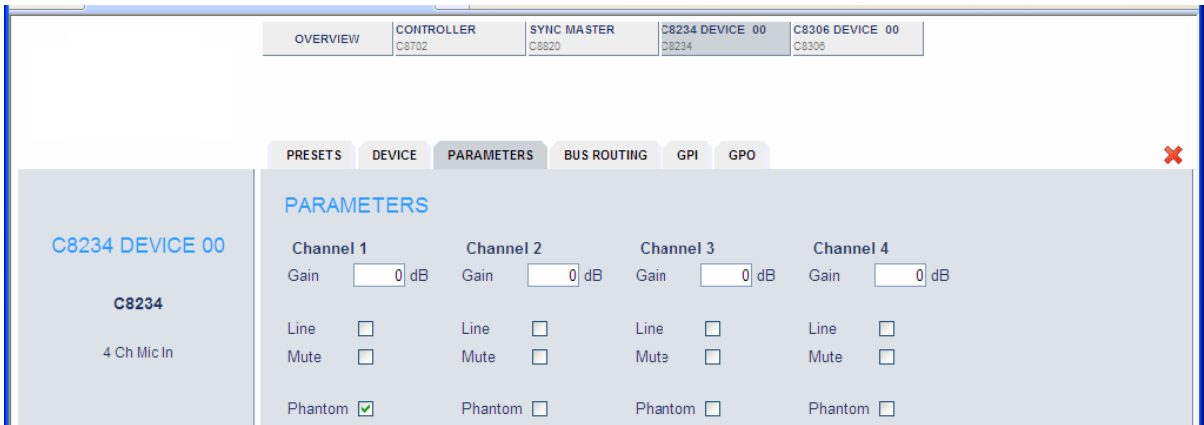
Clicking BACKUP stores all settings to file.

Restore all settings from File

Clicking RESTORE restores all settings from the selected file/destination.

PARAMETERS Page

The PARAMETERS Page enters mic settings manually.



AD914 Web Configuration Parameters page

Gain

0 dB, 10–65 dB.

Line

Selecting this option activates a 10-dB input attenuation pad.

Mute

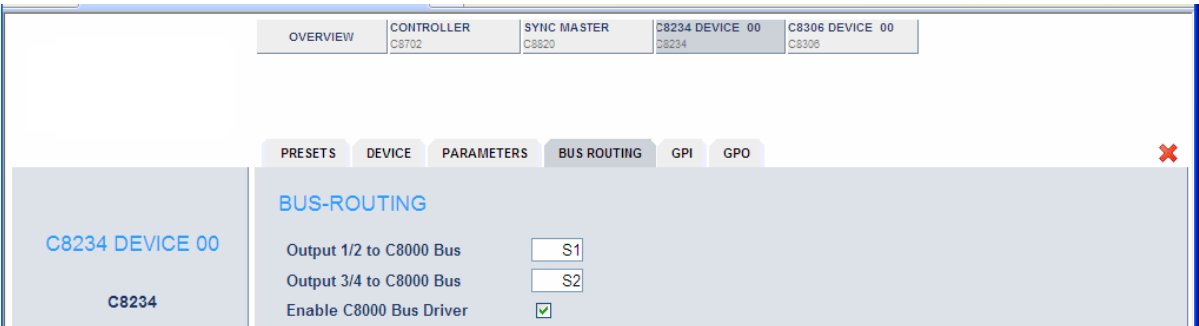
Selecting this option mutes the selected input.

Phantom

Selecting this option turns 48 V phantom power on for the selected input.

BUS ROUTING Page

This page controls bus routing from the AD914.



AD914 Web Configuration Bus Routing page

Output 1/2 To C8000 Bus

Selecting this option routes mic inputs 1/2 to the selected audio bus in 2-channel mode (S1–S32/OFF).

Output 3/4 To C8000 Bus

Selecting this option routes mic inputs 3/4 to the selected audio bus in 2-channel mode (S1–S32/OFF).

Enable C8000 Bus Driver

Selecting this option enables module routing.

GPI Page

This page sets up frame-wide GPI numbers to trigger dedicated module functions.

If a GPIO system module detects a GPI input, it puts the associated GPI number on the CAN bus. Each frame module watches for these GPI numbers and performs the pre-programmed action if it reads that number on the CAN bus.

 *Do not assign the same GPIO numbers to different functions because this incorrectly triggers multiple functions.*

OVERVIEW

CONTROLLER
C8702

SYNC MASTER
C8820

C8234 DEVICE 00
C8234

C8306 DEVICE 00
C8306

PRESETS

DEVICE

PARAMETERS

BUS ROUTING

GPI

GPO

C8234 DEVICE 00

C8234

4 Ch Mic In

GPI

Preset 1

OFF

Preset 2

OFF

Preset 3

OFF

Preset 4

OFF

Preset 5

OFF

Preset 6

OFF

Preset 7

OFF

Preset 8

OFF

Mute 1

OFF

Mute 2

OFF

Mute 3

OFF

Mute 4

OFF

Phantom 1

OFF

Phantom 2

OFF

Phantom 3

OFF

Phantom 4

OFF

Line 1

OFF

Line 2

OFF

Line 3

OFF

Line 4

OFF

AD914 Web Configuration GPI page

Preset 1–8

A GPI input can be set to recall a preset.

Mute 1–4

A GPI input can be set to mute selected channel.

Phantom 1–4

A GPI input can be set to enable phantom power for selected mic.

Line 1–4

A GPI input can be set to enable a 10-dB input pad for selected channel.

GPO Page

This page configures GPO events for the AD914.

💡 Do not assign the same GPIO numbers to different functions because this incorrectly triggers multiple functions.

OVERVIEW

CONTROLLER
C8702

SYNC MASTER
C8820

C8234 DEVICE 00
C8234

C8306 DEVICE 00
C8306

PRESETS

DEVICE

PARAMETERS

BUS ROUTING

GPI

GPO

C8234 DEVICE 00

C8234

4 Ch Mic In

GPO

Preset 1

OFF

Preset 2

OFF

Preset 3

OFF

Preset 4

OFF

Preset 5

OFF

Preset 6

OFF

Preset 7

OFF

Preset 8

OFF

Mute 1

OFF

Mute 2

OFF

Mute 3

OFF

Mute 4

OFF

Phantom 1

OFF

Phantom 2

OFF

Phantom 3

OFF

Phantom 4

OFF

Line 1

OFF

Line 2

OFF

Line 3

OFF

Line 4

OFF

Overload 1

OFF

Overload 2

OFF

AD914 Web Configuration GPO page

Preset 1–8

A GPO output can be set to trigger when a Preset is recalled.

Mute 1–4

A GPO output can be set to trigger when the selected mic channel is muted

Phantom 1–4

A GPO output can be set to trigger when phantom power on the selected channel is enabled

Line 1–4

A GPO output can be set to trigger when the 10-dB input pad on the selected channel is enabled

Overload 1–4

A GPO output can be set to trigger when the mic overload indicator on the selected channel lights

Technical Specifications

Analog Input

Dynamic Range	110 dB (RMS)
THD+N	<0.09% @ maximum input level
Equivalent Input Noise	126.5 dB (RMS) @ 200 Ω , 40 dB gain
Maximum Input Level	+15 dBu (mic) +22 dBu (line)
Frequency Response	48 kHz: 10 Hz (-3 dB) – 20 kHz (-0,5 dB) 96 kHz: 10 Hz (-3 dB) – 40 kHz (-0,5 dB)
Crosstalk	>90 dB (20 kHz)
CMR	>80 dB (20 kHz)
Differential Input Impedance	mic: 9 k Ω line: 20 k Ω
Gain	0, 10–65 dB, in 1 dB increments

Digital Output

Resolution	24 bit
Sample Rate	32–96 kHz

General Specifications

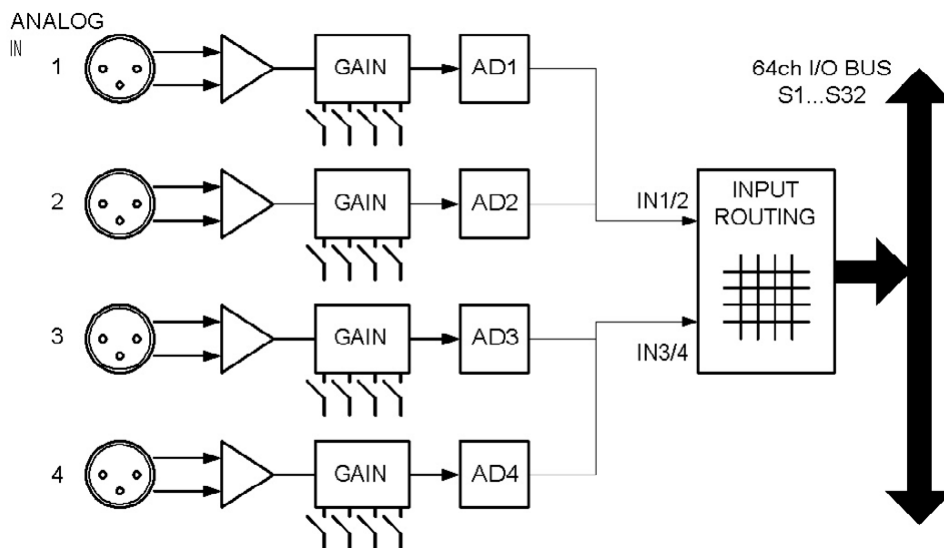
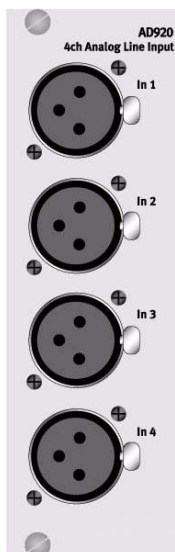
RJ-45 Input Connector	4, 5: GND; 3: +; 6: -
Backplane Connector	DIN41612, 64-pin, a+b, male
Power Supply	+5 VDC
Consumption	~1300 mA
Dimensions	3 RU, 4 HP (1 slot)

AD920 4ch Analog Line Input (XLR)

The AD920 is a four-channel, analog, line input A/D interface.

Features

- 24-bit sigma-delta A/D-converter
- 96 kHz maximum sample rate
- Floating balanced analog inputs
- Electrical isolation between channels

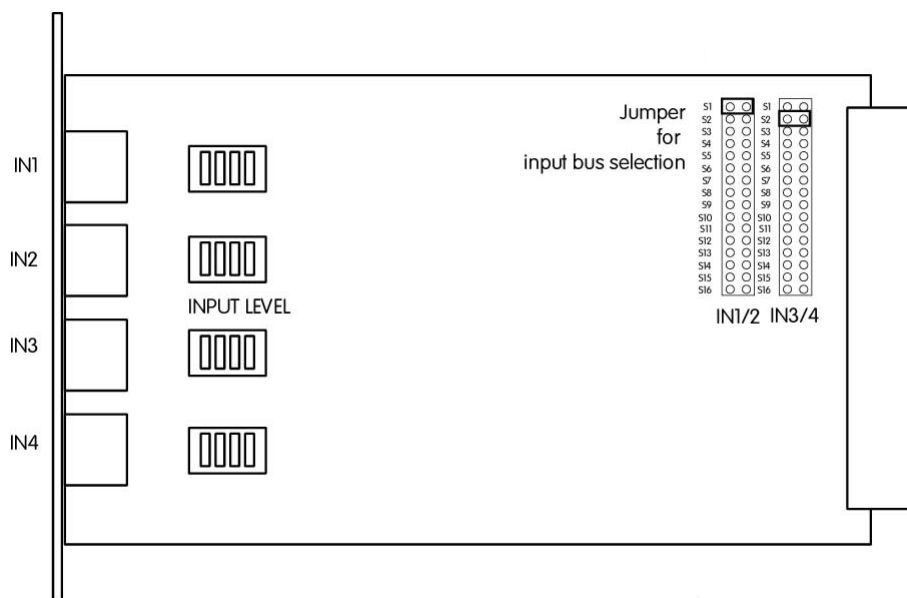


AD920 front panel (left) and block diagram (right)

Installation Considerations

Bus Select Jumper 1/2: Routes line inputs 1/2 to the selected audio bus in 2-channel mode (S1–S32/OFF).

Bus Select Jumper 3/4: Routes line inputs 3/4 to the selected audio bus in 2-channel mode (S1–S32/OFF).



AD920 installation diagram

Input Level Switches: Use the table below to set switches 1–4 to match the selected input level to 0 dBFS (full scale level).

For Example: Set 0 dBFS = +24 dB to achieve -20 dBFS = +4 dBu = 0 VU.

Analog Level 0 dBFS (full scale)	SW1	SW2	SW3	SW4
+15 dBu	OFF	OFF	OFF	OFF
+18 dBu	OFF	OFF	OFF	ON
+21 dBu	OFF	OFF	ON	OFF
+24 dBu	OFF	ON	OFF	OFF
+28 dBu	ON	OFF	OFF	OFF

 To avoid damaging analog circuits, install a master sync source module in a red reserved slot before applying AC power.

Technical Specifications

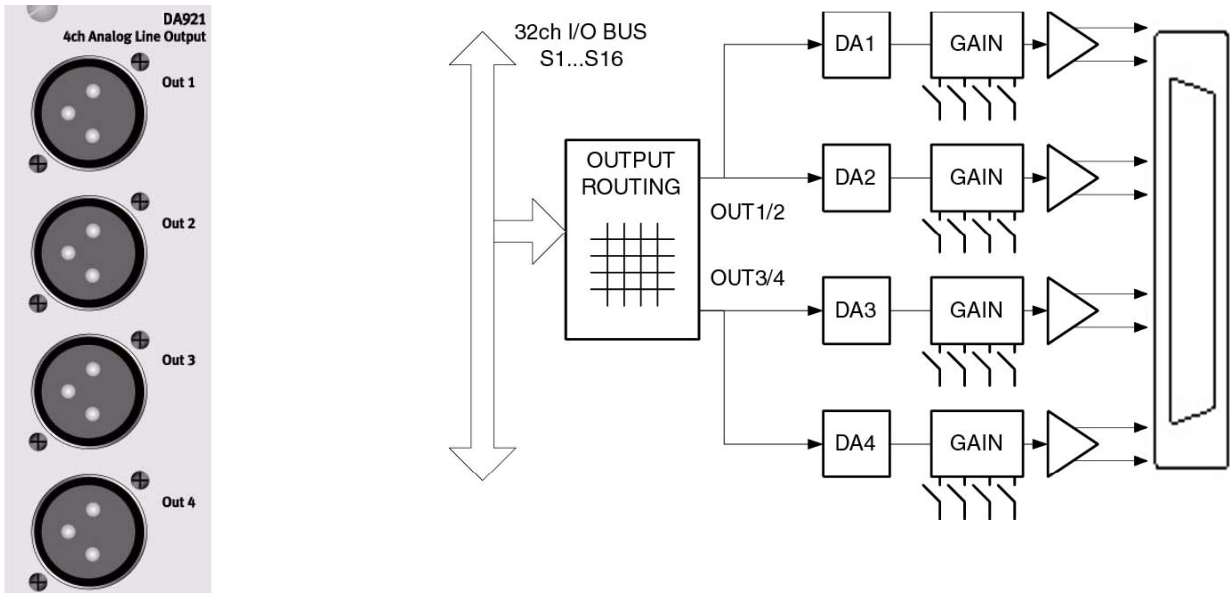
Resolution	24 bit
Sample Rate	32–96 kHz
Dynamic Range	113 dB (RMS) 116 dB (A)
THD+N	<0.002% @ maximum input level
Frequency Response	48 kHz: 10 Hz – 20 kHz (±0,5 dB) 96 kHz: 10 Hz – 40 kHz (±0,5 dB)
Crosstalk	>100 dB (1 kHz) >95 dB (20 kHz) >85dB (40 kHz)
Maximum Input Level	15–28 dBu @ 0dBFS
Input Impedance	10 kΩ, floating balanced
Connector	XLR, 1:GND, 2:+, 3: -
Backplane Connector	DIN41612, 64-pin, a+b, male
Power Supply	+5 VDC
Consumption	~850 mA
Dimensions	3 RU, 8 HP (2 slots)

DA921 4ch Analog Line Output (XLR)

The DA921 is a four-channel, analog, line output D/A interface.

Features

- 24-bit sigma-delta A/D-converter
- Maximum sample rate: 96 kHz
- Floating balanced analog inputs
- Electrical isolation between channels

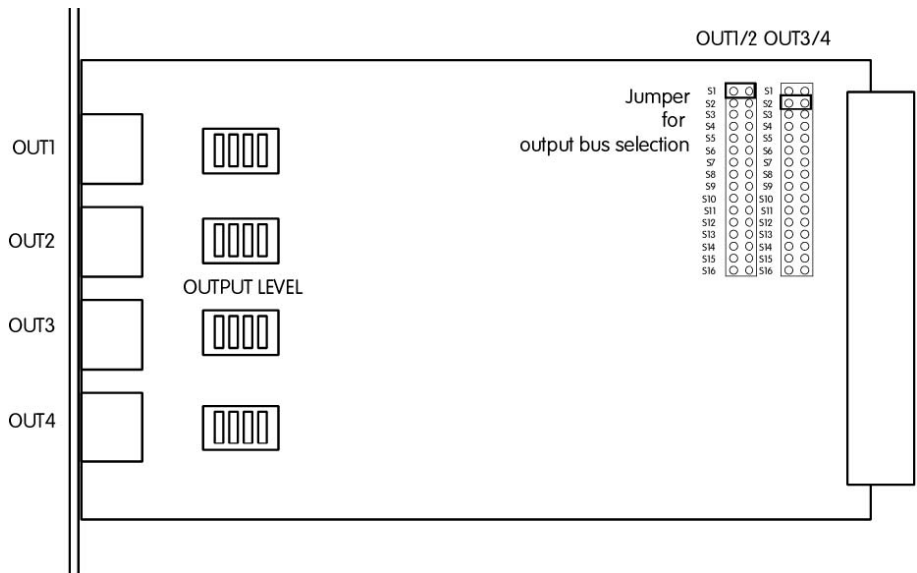


DA921 front panel (left) and block diagram (right)

Installation Considerations

Bus Select Jumper 1/2: Routes line outputs 1/2 to the selected audio bus in 2-channel mode (S1–S32/OFF).

Bus Select Jumper 3/4: Routes line outputs 3/4 to the selected audio bus in 2-channel mode (S1–S32/OFF).



DA921 installation diagram

OUTPUT LEVEL Switches: Use the table below to set switches 1–4 to match the selected input level to 0 dBFS (full scale level).

For Example: Set 0 dBFS = +24 dB to achieve -20 dBFS = +4 dBu = 0 VU.

Analog Level 0 dBFS (full scale)	SW1	SW2	SW3	SW4
+15 dBu	OFF	OFF	OFF	OFF
+18 dBu	OFF	OFF	OFF	ON
+21 dBu	OFF	OFF	ON	OFF
+24 dBu	OFF	ON	OFF	OFF
+28 dBu	ON	OFF	OFF	OFF

Technical Specifications

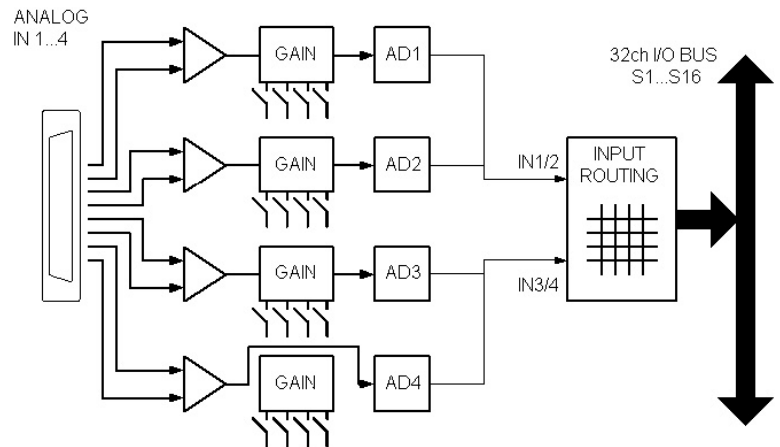
Resolution	24 bit
Sample Rate	32–96 kHz
Dynamic Range	112 dB (RMS) 117 dB (A)
THD+N	<0.002% @ maximum output level
Frequency Response	48 kHz: 20 Hz – 20 kHz (±0,5 dB) 96 kHz: 20 Hz – 40 kHz (±0,5 dB)
Crosstalk	>110 dB (1 kHz) >105 dB (20 kHz) >90 dB (40 kHz)
Maximum Output Level	15–28 dBu @ 0dBFS
Output Impedance	80 Ω, floating balanced
Connector	XLR, 1-screen, 2-live, 3-return
Backplane Connector	DIN41612, 64-pin, a+b, male
Power Supply	+5 VDC
Consumption	~650 mA
Dimensions	3 RU, 8 HP (2 slots)

AD922 4ch Analog In (D-Sub)

The AD922 is a four-channel, analog, line input A/D interface.

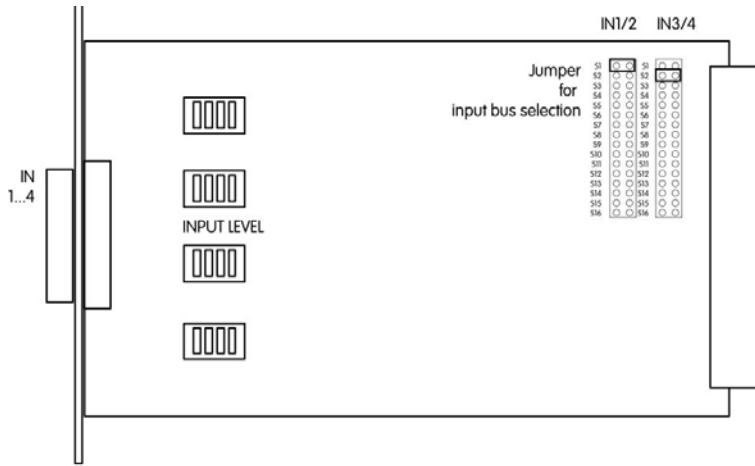
Features

- 24-bit sigma-delta A/D-converter
- Maximum sample rate: 96 kHz
- Floating balanced analog inputs
- Electrical isolation between channels



AD922 front panel (left) and block diagram (right)

Installation Considerations



AD922 installation diagram

Bus Select Jumper 1/2: Routes line inputs 1/2 to the selected audio bus in 2-channel mode (S1–S32/OFF).

Bus Select Jumper 3/4: Routes line inputs 3/4 to the selected audio bus in 2-channel mode (S1–S32/OFF).

INPUT LEVEL switches: Use the table below to set switches 1–4 to match the selected input level to 0 dBFS (full scale level).

For Example: Set 0 dBFS = +24 dB to achieve -20 dBFS = +4 dBu = 0 VU.

Analog Level 0 dBFS (full scale)	SW1	SW2	SW3	SW4
+15 dBu	OFF	OFF	OFF	OFF
+18 dBu	OFF	OFF	OFF	ON
+21 dBu	OFF	OFF	ON	OFF
+24 dBu	OFF	ON	OFF	OFF
+28 dBu	ON	OFF	OFF	OFF

15-Pin D-Sub Pinout

Signal	+	GND	-
Input 1	9	2,10	1
Input 2	11	4, 12	3
Input 3	6	5	13
Input 4	8	7, 14	15

Technical Specifications

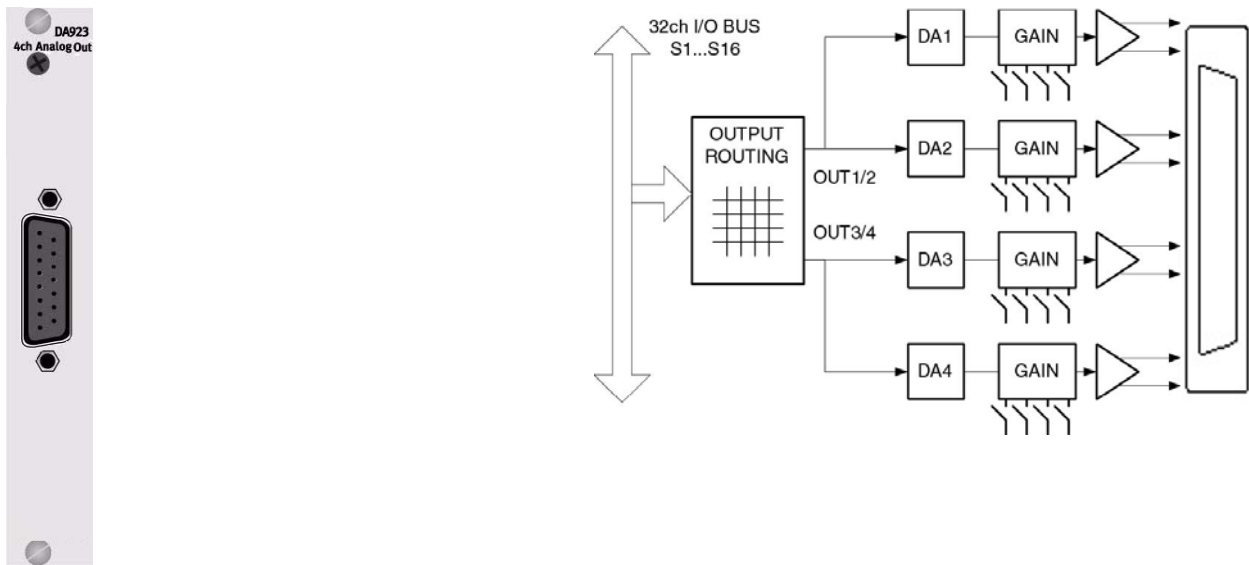
Resolution	24 bit
Sample Rate	32–96 kHz
Dynamic Range	113 dB (RMS) 116 dB (A)
THD+N	<0.002% @ maximum input level
Frequency Response	48 kHz: 20 Hz – 20 kHz (±0,5 dB) 96 kHz: 20 Hz – 40 kHz (±0,5 dB)
Crosstalk	>100 dB (1 kHz) >95 dB (20 kHz) >85dB (40 kHz)
Maximum Input Level	15–28 dBu @ 0dBFS
Input Impedance	10 kΩ, floating balanced
Connector	15-pin D-Sub, female panel
Backplane Connector	DIN41612, 64-pin, a+b, male
Power Supply	+5 VDC
Consumption	~850 mA
Dimensions	3 RU, 4 HP (1 slot)

DA923 4ch Analog Out (D-Sub)

The DA923 is a four-channel, analog, line out D/A interface.

Features

- 24-bit sigma-delta A/D-converter
- 96 kHz maximum sample rate
- Floating balanced analog inputs
- Electrical isolation between channels

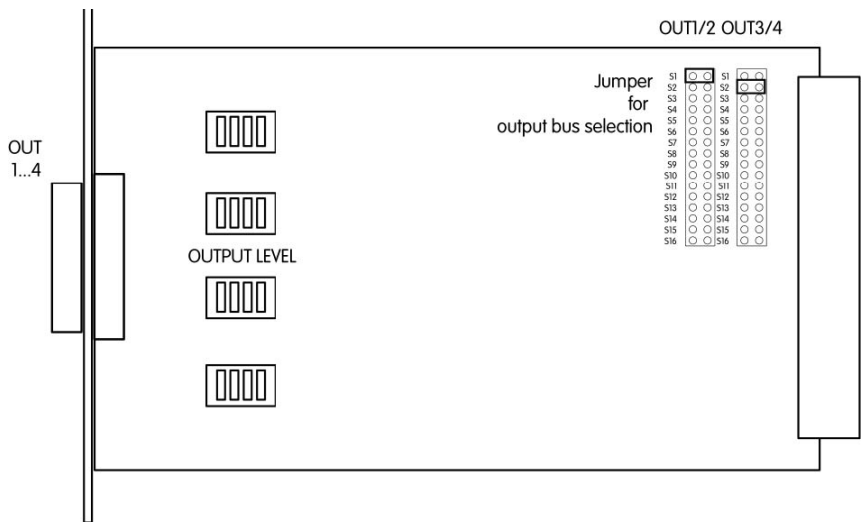


DA923 front panel (left) and block diagram (right)

Installation Considerations

Bus Select Jumper 1/2: Routes the selected audio bus to line outputs 1/2 in 2-channel mode (S1–S32/OFF).

Bus Select Jumper 3/4: Routes the selected audio bus to line outputs 3/4 in 2-channel mode (S1–S32/OFF).



DA923 installation diagram

OUTPUT LEVEL Switches: Use the table below to set switches 1–4 to match the selected output level to 0 dBFS (full scale level).

For Example: Set 0 dBFS = +24 dB to achieve -20 dBFS = +4 dBu = 0 VU.

Analog Level 0 dBFS (full scale)	SW1	SW2	SW3	SW4
+15 dBu	OFF	OFF	OFF	OFF
+18 dBu	OFF	OFF	OFF	ON
+21 dBu	OFF	OFF	ON	OFF
+24 dBu	OFF	ON	OFF	OFF
+28 dBu	ON	OFF	OFF	OFF

15 Pin D-Sub Pinout

Signal	+	GND	-
Input 1	9	2, 10	1
Input 2	11	4, 12	3
Input 3	6	5	13
Input 4	8	7, 14	15

Technical Specifications

Resolution	24 bit
Sample Rate	32–96 kHz
Dynamic Range	112 dB (RMS) 117 dB (A)
THD+N	<0.002% @ maximum output level
Frequency Response	48 kHz: 20 Hz – 20 kHz (±0,5 dB) 96 kHz: 20 Hz – 40 kHz (±0,5 dB)
Crosstalk	>110 dB (1 kHz) >105 dB (20 kHz) >90 dB (40 kHz)
Maximum Output Level	15–28 dBu @ 0dBFS
Output Impedance	60 Ω, floating balanced
Connector	15-pin D-Sub, female panel
Backplane Connector	DIN41612, 64-pin, a+b, male
Power Supply	+5 VDC
Consumption	~650 mA
Dimensions	3 RU, 4 HP (1 slot)

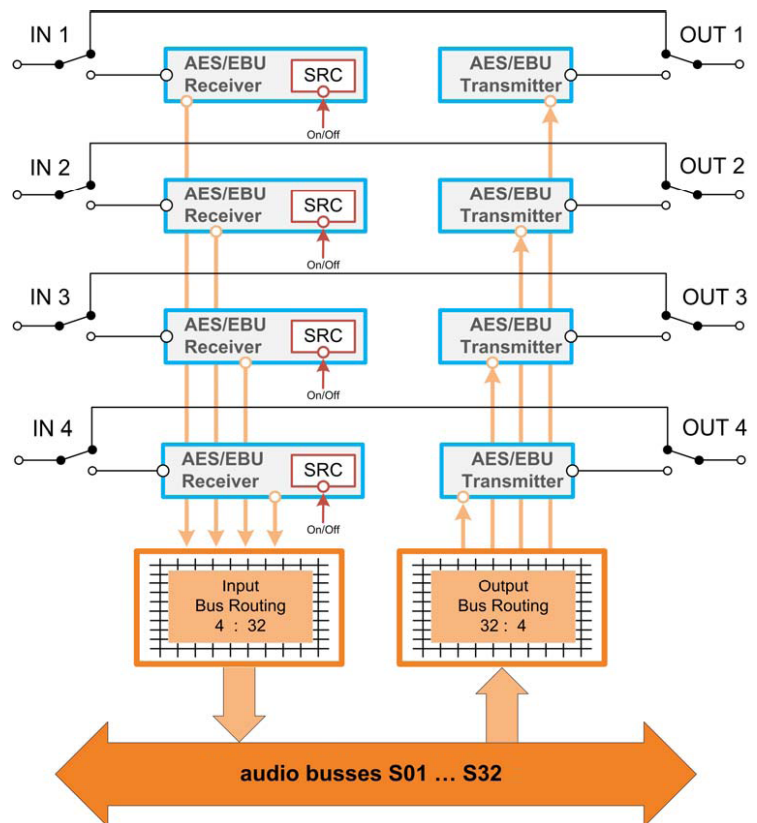
Chapter 10: AES I/O and HD Modules

DD915 8ch AES I/O (110 Ohm)

The DD915 is an 8-channel AES I/O with four inputs and four outputs.

Features

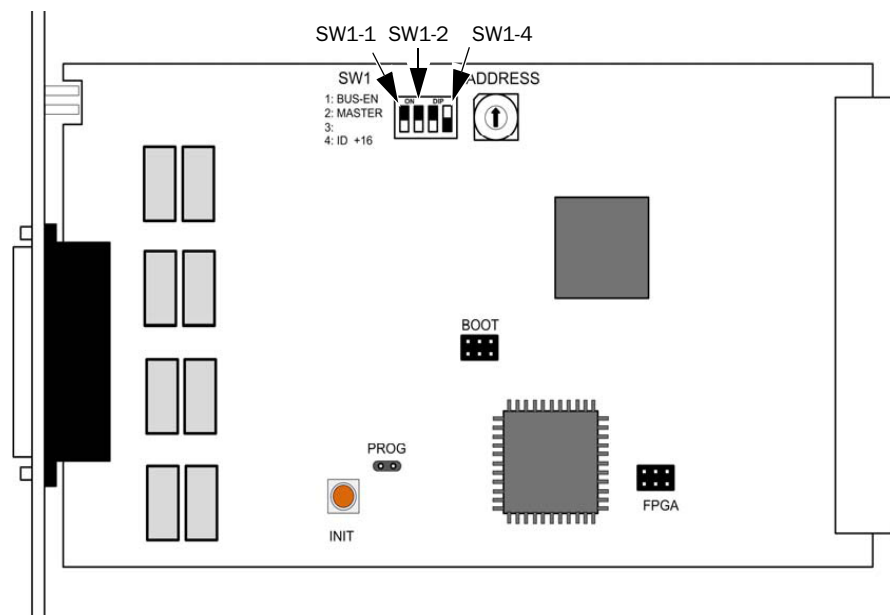
- Four balanced AES/EBU inputs, four balanced AES/EBU outputs
- Input sample rate converters
- Relay bypass for pairs of I/Os
- Relay wait time after power up
- Master mode (clock master for the frame)
- 25-pin D-Sub, industry standard (TASCAM) pin assignment
- Remote control using FC972 Remote, GPIO or http based API



DD915 front panel (left) and block diagram (right)

Installation Considerations

To initialize the module parameters to factory default values, press the INIT button during power on.



DD915 installation diagram

SW1 Functions

SW1 has four DIP switches that enable/disable BUS-EN, MASTER, and ID+16. SW1-3 is unused. To set a switch ON, move it to the *up* position.

⚠ To avoid damaging analog circuits, install a master sync source module in a red reserved slot before applying AC power.

Setting the CAN ID

Each frame must be fitted with an FC972 Remote to externally configure all modules (except analog line in/out and WC984) and control mic preamps remotely using a web browser. Install only one FC972 per frame and up to two SY983s (for redundant operation, differentiated by Master/Slave setting).

A Module's system ID consists of the **Frame ID + module CAN ID**. The Frame ID is determined by the FC972's IP Address/Subnet/Host Address. The FC972 must be assigned a unique IP Address based on the frame's role within the system. A CAN ID must be set for each externally controllable module. Most modules have 32 CAN ID settings available but the AD914 Remote Mic Pre-amp has 16.

The FC972 and SY983 have default module CAN IDs that do not interfere with those of other modules. The internal CAN bus must be terminated once per frame, either on the FC972 or SY983.

Using the CAN Address switches on the FC972 or SY983 is an older method of setting the Frame ID. An explicit CAN Address must be set only when employing a hardware CAN-BUS remote controller to configure frames. In System 5, the Frame ID is set with the FC972's IP Address for configuration using a web browser interface.

To set the CAN ID in range 0–15:

- 1 Set SW1-4 to OFF.
- 2 Use the CAN Rotary Switch to set the CAN ID.

To set the CAN ID in range 16–31:

- 1 Set SW1-4 to ON.
- 2 Use the CAN Rotary Switch to set the CAN ID.

Setting BUS-EN

The output configuration is taken from the non-volatile memory.

- SW1-1 ON connects the outputs to the audio busses on power up.
- SW1-1 OFF disconnects the module outputs from the audio busses on power up.



*To avoid audio bus conflicts when installing or replacing a module and the configuration is unknown, disable the output bus drivers by setting **BUS-EN = OFF** before inserting it. If all settings are done remotely and the unit fits into the frame's bus assignment scheme, remove it and set **BUS-EN = ON**.*

Setting MASTER

If this module will be the master sync source in a IO93 or IO94 Frame, it must be placed in a red reserved slot. Select the input to use as clock reference using the web browser interface.

- SW1-2 ON sets this module as clock master for the frame.
- SW1-2 OFF if this module is not clock master for the frame.

Front Panel LEDs

Status LED

Green	Status OK
Green flashing	Module is under FC972 Remote control
Red	Status is bad, remote reading of the status with GUI is required. The FC972 Remote has probably issued a SNMP trap.

MASTER LED

Off	The audio bus interface clock must be provided by the frame
Red	DD915 is clock master for the frame

25-Pin D-Sub Pinout

Signal	+	GND	-
AES 1 In	24	25	12
AES 1 Out	18	19	6
AES 2 In	10	11	23
AES 3 Out	4	5	17
AES 3 In	21	22	9
AES 3 Out	15	16	3
AES 4 In	7	8	20
AES 4 Out	1	2	14

Remote Configuration using a Web Browser

The DD915 is configured using a web browser interface, which requires fitting an FC972 Remote in the frame.

 See “FC972 Remote” on page 35.

OVERVIEW Page

This page provides an overview of the frame’s modules. Click the wrench tool to open the configuration pages of that module.



DD915 Web Configuration Overview page with wrench tool

DEVICE Page

This page configures and displays device-specific DD915 parameters.

C8188 DEVICE 00

C8188

4x AES/EBU Input/Output

Master

AES Input Status

In 1/2

In 3/4

In 5/6

In 7/8

Bus Status

Ch 1/2

Ch 3/4

Ch 5/6

Ch 7/8

Device Name

C8188 DEVICE 00

CHANGE NAME

FIRMWARE

Controller

03

FPGA

20

Restart Module

RESTART

Initialize and Restore Factory Defaults

INITIALIZE

Backup Settings and Presets to File

BACKUP

Restore Settings and Presets from File

RESTORE

Durchsuchen...

DD915 Web Configuration Device page

Device Name

This field displays the current name. Click CHANGE NAME to rename the device.

Restart Module

Clicking RESTART initiates a warm start.

Initialize and restore factory defaults

Clicking INITIALIZE restores factory default settings.

Controller Version

This displays the module’s firmware version.

Backup all settings to File

Clicking BACKUP stores all settings to file.

Restore all settings from File

Clicking RESTORE restores all settings from the selected file/destination.

Setup/ Routing Page

This page controls DD915 routing and setup parameters.

OVERVIEWCONTROLLER C8702C8188 DEVICE 00C8188HD-SDI I-O C8404C8601 DEVICE 00C8601

DEVICESETUP / ROUTINGGPO

C8188 DEVICE 00

C8188

4x AES/EBU Input/Output

Master

AES Input Status

In 1/2

In 3/4

In 5/6

In 7/8

Bus Status

Ch 1/2

Ch 3/4

Ch 5/6

Ch 7/8

Relay Bypass

OffOn

Relay Wait Time After Power Up

7

sec

Input

In 1/2

In 3/4

In 5/6

In 7/8

MASTER SELECT

Sample Rate Converter

SRC

offon

offon

offon

offon

to C8000 Bus Input Mux

2ch8ch

Ch 1/2

S1

Ch 3/4

S2

Ch 5/6

S3

Ch 7/8

S4

Enable Bus Driver

from C8000 Bus Output Mux

2ch8ch

S9

Ch 1/2

S10

Ch 3/4

S11

Ch 5/6

S12

Ch 7/8

Output

Out 1/2

Out 3/4

Out 5/6

Out 7/8

AES Input Error Detection

OffOn

Error type

Lock

Validity

Parity

In 1/2

In 3/4

In 5/6

In 7/8

Ch 1/2

Ch 3/4

Ch 5/6

Ch 7/8

Bus Error Detection

OffOn

DD915 Web Configuration Setup/ Routing page

Relay Bypass

The AES I/Os provide a bypass relay for all eight channels, which may be turned off. With Relay Bypass On, the I/Os are in Relay Bypass mode.

Relay Wait Time After Power Up

The Relay Bypass is active as long as the module has no power. If power is turned on, the module waits this amount of time before the relays are engaged to disable Relay Bypass.

MASTER SELECT

If the module is set to MASTER mode, select one of the four AES/EBU inputs to use as the clock reference. The module must be installed in one of the frame’s red reserved slots.

Sample Rate Converter

Each AES/EBU input can be enabled/disabled for SRC.

To C8000 Bus Output Mux

The multiplex mode for audio signals routed to the audio bus can be set to 2ch or 8ch.

Enable Bus Driver

Selecting this option turns on all module bus drivers (from tri-state mode).

From C8000 Bus Output Mux

The multiplex mode for incoming audio signals from the audio bus can be set to 2ch or 8ch.

AES Input Error Detection

This option can be enabled to monitor the status of the AES/EBU inputs for signal presence and three detailed error types:

Lock	AES receiver lock status
Validity	AES3 validity bit detected
Parity	AES parity (data errors detection)

Each AES/EBU input can be masked for error detection:

Grey	Error detection disabled
Green	No error detected/PCM audio
Yellow	No error detected/non-audio (Dolby E, D)
Red	Indicates an error condition

The input status may be presented to external monitoring systems using SNMP. The frame controller summarizes such status information and generates SNMP traps for the frame as an entity or may activate GPOs (if GPIO module(s) are installed). The SNMP manager may afterwards poll the modules Status (see “SNMP Functions Setup” on page 62).

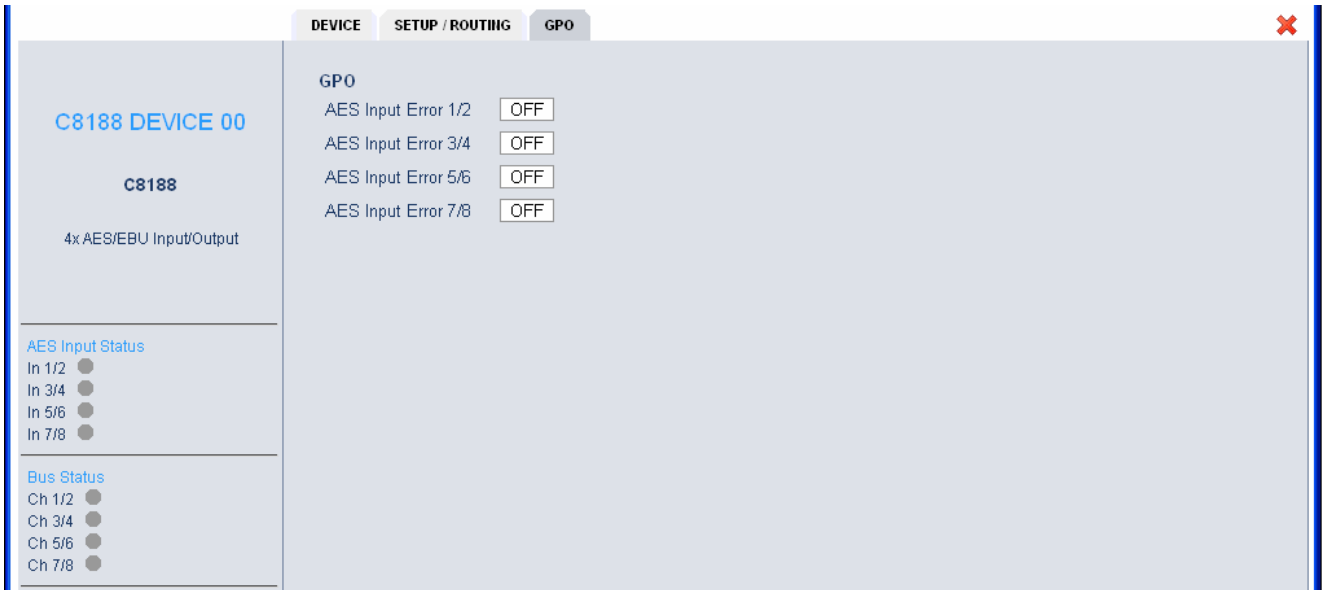
Bus Error Detection

Monitors the serial audio data from the frame bus to properly position an Error-Flag. A bad Error-Flag indicates a disturbance upstream (i.e., input signal, input module, other DSP module). The Error Detection can be turned Off and On for each input from the bus. An LED denotes the status of the busses on the left side.

Grey	Error detection disabled
Green	No error detected/PCM audio
Yellow	No error detected/non-audio (Dolby E, D)
Red	Indicates an error condition

GPO Page

This page configures GPO events for the DD915.



DD915 Web Configuration GPO page

AES Input Error 1/2, 3/4, 5/6, 7/8

A GPO output can be set to trigger when an AES/EBU input error is detected on the selected channel pair.

 Do not assign the same GPIO numbers to different functions because this incorrectly triggers multiple functions.

Technical Specifications

Audio

Resolution	24-bit
Sample Rate	32–48 kHz
Format	AES/EBU
Input Impedance	110 Ω balanced
Output Impedance	110 Ω balanced
Input Level	> 0.3 Vpp
Output Level	3.0 Vpp

General

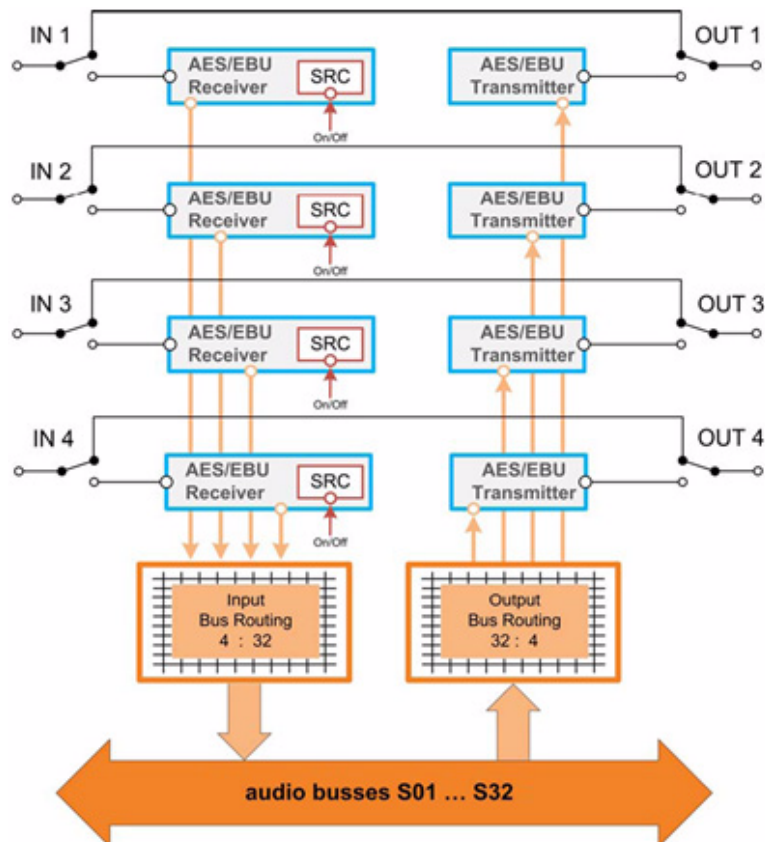
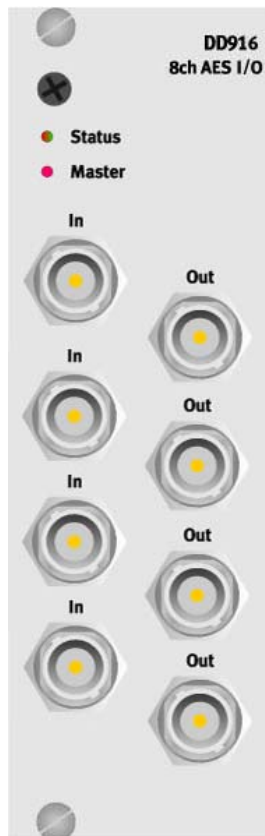
Connector	25-pin D-Sub, female
Backplane Connector	DIN41612, 64-pin, a+b, male
Power Supply	+5 VDC
Power Consumption	~1.000 mA
Dimension	3 RU, 4 HP (1 slot)
Temperature	10–40°C
Humidity	90%, non-condensing

DD916 8ch AES I/O (75 Ohm)

The DD916 is a digital eight-channel AES I/O interface.

Features

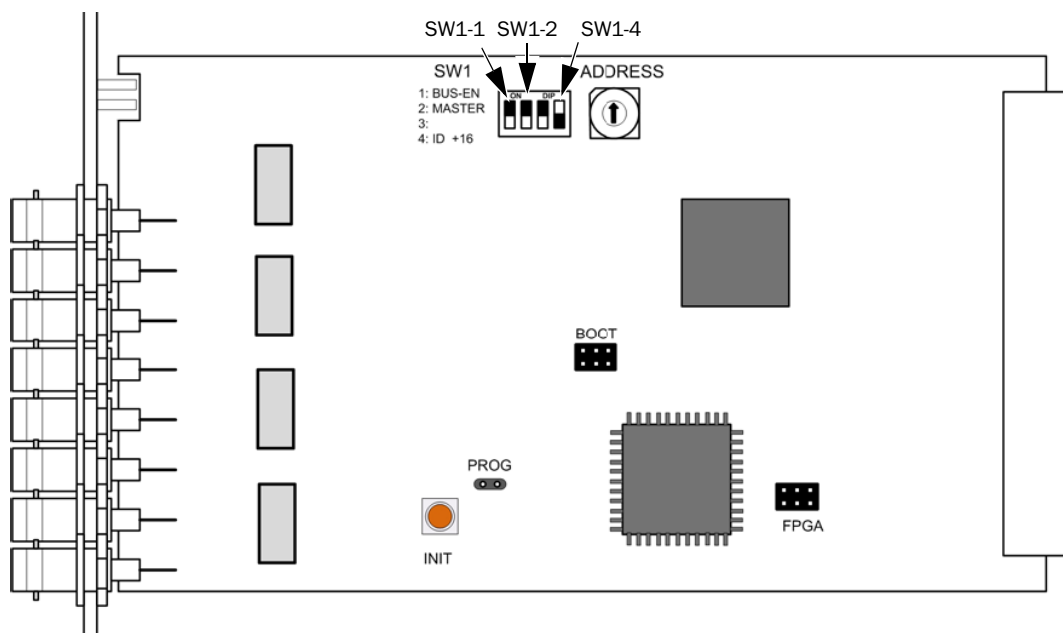
- Four 75-Ω BNC inputs, four balanced 75-Ω BNC outputs
- Input sample rate converters
- Relay bypass for I/O pairs
- Relay wait time after power up
- Master mode (clock master for the frame)
- Remote control using FC972 Remote, GPIO, or web-based API



DD916 front panel (left) and block diagram (right)

Installation Considerations

To initialize the module parameters to factory default values, press the INIT button during power on. To set a switch ON, move it to the *up* position.



DD916 installation diagram

SW1 Options

SW1 has four DIP switches that enable/disable BUS-EN, MASTER, and ID+16. SW1-3 is unused.

⚠ To avoid damaging analog circuits, install a master sync source module in a red reserved slot before applying AC power.

Setting the CAN ID

Each frame must be fitted with an FC972 Remote to externally configure all modules (except analog line in/out and WC984) and control mic preamps remotely using a web browser. Install only one FC972 per frame and up to two SY983s (for redundant operation, differentiated by Master/Slave setting).

A Module's system ID consists of the **Frame ID + module CAN ID**. The Frame ID is determined by the FC972's IP Address/Subnet/Host Address. The FC972 must be assigned a unique IP Address based on the frame's role within the system. A CAN ID must be set for each externally controllable module. Most modules have 32 CAN ID settings available but the AD914 Remote Mic Pre-amp has 16.

The FC972 and SY983 have default module CAN IDs that do not interfere with those of other modules. The internal CAN bus must be terminated once per frame, either on the FC972 or SY983.

Using the CAN Address switches on the FC972 or SY983 is an older method of setting the Frame ID. An explicit CAN Address must be set only when employing a hardware CAN-BUS remote controller to configure frames. In System 5, the Frame ID is set with the FC972's IP Address for configuration using a web browser interface.

To set the CAN ID in range 0–15:

- 1 Set SW1-4 to OFF.
- 2 Use the CAN Rotary Switch to set the CAN ID.

To set the CAN ID in range 16–31:

- 1 Set SW1-4 to ON.
- 2 Use the CAN Rotary Switch to set the CAN ID.

Setting BUS-EN

The output configuration is taken from the non-volatile memory.

- SW1-1 ON connects the outputs to the audio busses on power up.
- SW1-1 OFF disconnects the module outputs from the audio busses on power up.



*To avoid audio bus conflicts when installing or replacing a module and the configuration is unknown, disable the output bus drivers by setting **BUS-EN = OFF** before inserting it. If all settings are done remotely and the unit fits into the frame's bus assignment scheme, remove it and set **BUS-EN = ON**.*

Setting MASTER

If this module will be the master sync source in a IO93 or IO94 Frame, it must be placed in a red reserved slot. Select the input to use as clock reference using the web browser interface.

- SW1-2 ON sets this module as clock master for the frame.
- SW1-2 OFF if this module is not clock master for the frame.

Front Panel LEDs

Green	Status OK
Green Flashing	Module is under FC972 Remote control
Red	Status is bad, remote reading of the status with GUI is required. The FC972 Remote has probably issued a SNMP trap.

MASTER LED

Off	The audio bus interface clock must be provided by the frame
Red	DD916 is clock master for the frame

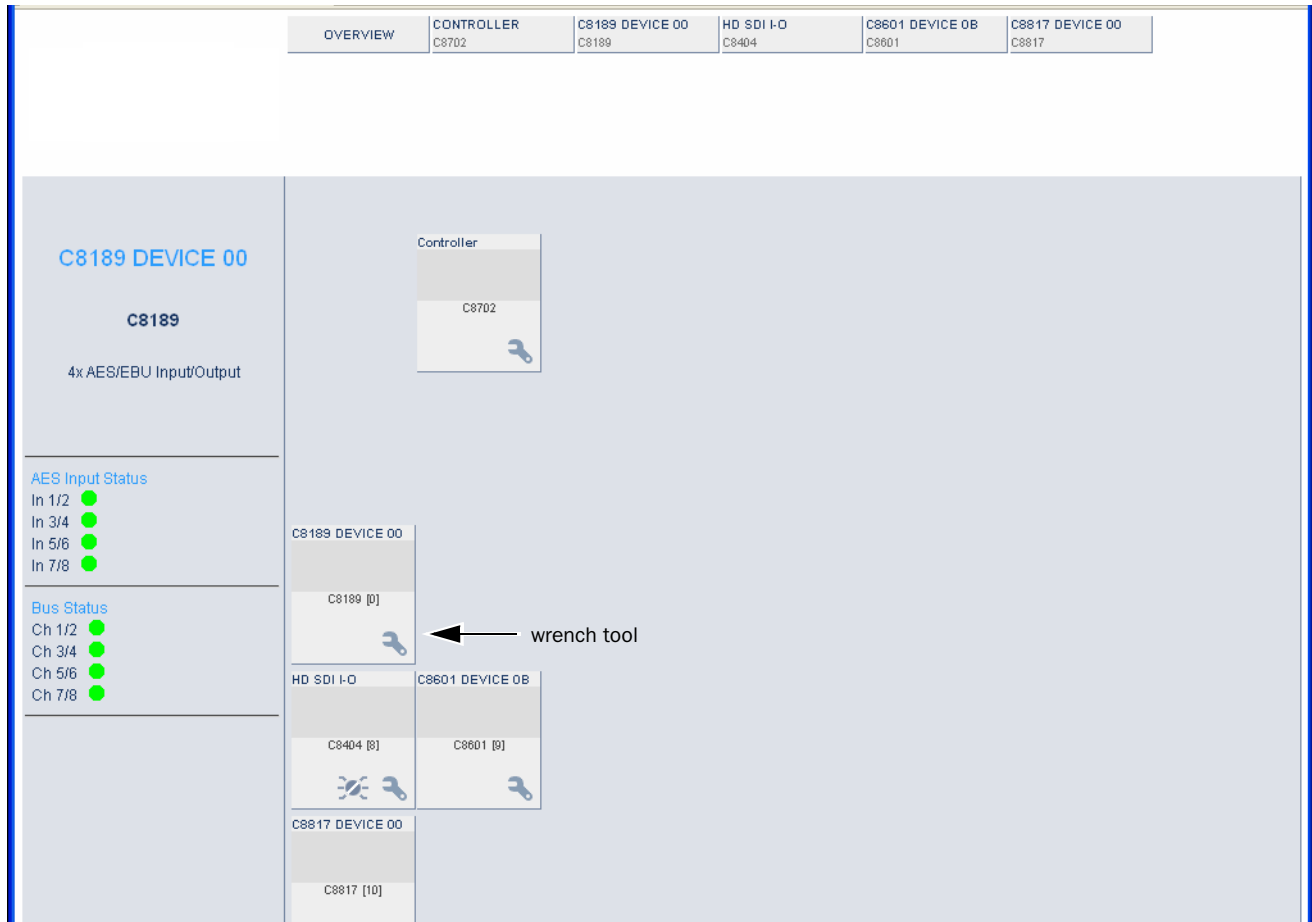
Remote Configuration using a Web Browser

The DD916 is configured using a web browser interface, which requires fitting an FC972 Remote in the frame.

 See “FC972 Remote” on page 35.

OVERVIEW Page

This page provides an overview of the frame’s modules. Click the wrench tool to open the configuration pages of that module.



DD916 Web Configuration Overview page with wrench tool

DEVICE Page

This page configures device-specific DD916 parameters.

C8189 DEVICE 00

C8189

4x AES/EBU Input/Output

AES Input Status

In 1/2

In 3/4

In 5/6

In 7/8

Bus Status

Ch 1/2

Ch 3/4

Ch 5/6

Ch 7/8

DEVICE

SETUP / ROUTING

GPO

Device Name

C8189 DEVICE 00

CHANGE NAME

FIRMWARE

Controller

04

FPGA

26

Restart Module

RESTART

Initialize and Restore Factory Defaults

INITIALIZE

Backup Settings and Presets to File

BACKUP

Restore Settings and Presets from File

RESTORE

Durchsuchen...

DD916 Web Configuration Device page

Device Name

This field displays the current name. Click CHANGE NAME to rename the device.

Restart Module

Clicking RESTART initiates a warm start.

Initialize and restore factory defaults

Clicking INITIALIZE restores factory default settings.

Controller Version

Displays the module’s firmware version.

Backup all settings to File

Clicking BACKUP stores all settings to file.

Restore all settings from File

Clicking RESTORE restores all settings from the selected file/destination.

SETUP/ROUTING Page

This page configures setup and routing for the DD916.

The screenshot shows the 'SETUP / ROUTING' page for 'C8189 DEVICE 00'. The page is divided into several sections:

- Relay Bypass:** Set to Off (radio button).
- Relay Wait Time After Power Up:** Set to 7 sec.
- Input:** Four input channels (In 1/2, In 3/4, In 5/6, In 7/8) with a 'MASTER SELECT' button.
- Sample Rate Converter:** Four SRC blocks, each with 'off' and 'on' radio buttons.
- to C8000 Bus Mux:** Four channels (Ch 1/2, Ch 3/4, Ch 5/6, Ch 7/8) with '2ch' and '8ch' radio buttons. An 'Enable Bus Driver' checkbox is checked.
- from C8000 Bus Mux:** Four channels (S1, S2, S3, S4) with '2ch' and '8ch' radio buttons.
- Output:** Four output channels (Out 1/2, Out 3/4, Out 5/6, Out 7/8).
- AES Input Status:** Four green status lights for In 1/2, In 3/4, In 5/6, and In 7/8.
- Bus Status:** Four green status lights for Ch 1/2, Ch 3/4, Ch 5/6, and Ch 7/8.
- AES Input Error Detection:** Set to On (radio button). Error type checkboxes for Lock, Validity, and Parity are all checked. Individual channel checkboxes for In 1/2, In 3/4, In 5/6, and In 7/8 are all checked.
- Bus Error Detection:** Set to On (radio button). Individual channel checkboxes for Ch 1/2, Ch 3/4, Ch 5/6, and Ch 7/8 are all checked.

DD916 Web Configuration Setup/ Routing page

Relay Bypass

The AES I/Os provide a bypass relay for all eight channels, which may be turned off. With Relay Bypass On, the I/Os are in Relay Bypass mode.

Relay Wait Time After Power Up

The Relay Bypass is active as long as the module has no power. If power is turned on, the module waits this amount of time before the relays are engaged to disable Relay Bypass.

MASTER SELECT

If the module is set to MASTER mode, select one of the four AES/EBU inputs to use as the clock reference.

Sample Rate Converter

Each AES/EBU input can be enabled/disabled for SRC.

To C8000 Bus Output Mux

The multiplex mode for audio signals routed to the audio bus can be set to 2ch or 8ch.

Enable Bus Driver

Selecting this option turns on all module bus drivers (from tri-state mode).

From C8000 Bus Output Mux

The multiplex mode for incoming audio signals from the audio bus can be set to 2ch or 8ch.

AES Input Error Detection

This option can be enabled to monitor the status of the AES/EBU inputs for signal presence and three detailed error types:

Lock	AES receiver lock status
Validity	AES3 validity bit detected
Parity	AES parity (data errors detection)

Each AES input can be masked for error detection:

Grey	Error detection disabled
Green	No error detected/PCM audio
Yellow	No error detected/non audio (Dolby E, D)
Red	Indicates an error condition.

The input status may be presented to external monitoring systems using SNMP. The frame controller summarizes such status information and generates SNMP traps for the frame as an entity or may activate GPOs (if GPIO module(s) are installed). The SNMP manager may afterwards poll the modules Status (see SNMP documentation for details).

Bus Error Detection

The serial audio data from the frame bus can be monitored for proper positioning of an Error-Flag. A bad Error-Flag indicates a disturbance upstream (i.e., input signal, input module, other DSP module). The Error Detection can be turned Off and On for each input from the bus. An LED denotes the status of the busses on the left side.

Grey	Error detection is disabled
Green	No error detected
Yellow	No error detected/non audio (Dolby E, D)
Red	Indicates an error condition.

The bus status may also be presented to external monitoring systems using SNMP.

GPO Page

This page configures GPO events for the DD916.

C8189 DEVICE 00

C8189

4x AES/EBU Input/Output

AES Input Status

In 1/2

In 3/4

In 5/6

In 7/8

Bus Status

Ch 1/2

Ch 3/4

Ch 5/6

Ch 7/8

GPO

AES Input Error 1/2

OFF

AES Input Error 3/4

OFF

AES Input Error 5/6

OFF

AES Input Error 7/8

OFF

DD916 Web Configuration GPO page

 Do not assign the same GPIO numbers to different functions because this incorrectly triggers multiple functions.

AES Input Error 1/2, 3/4, 5/6, 7/8

Sets a GPO output to trigger when an AES/EBU input error is detected on the selected channel pair.

Technical Specifications

Audio

Resolution	24-bit
Sample Rate	32–48 kHz
Format	AES/EBU
Input Impedance	75 Ω , unbalanced
Output Impedance	75 Ω, balanced
Input Level	0, 3–5 Vpp
Output Level	1, 0 Vpp

General

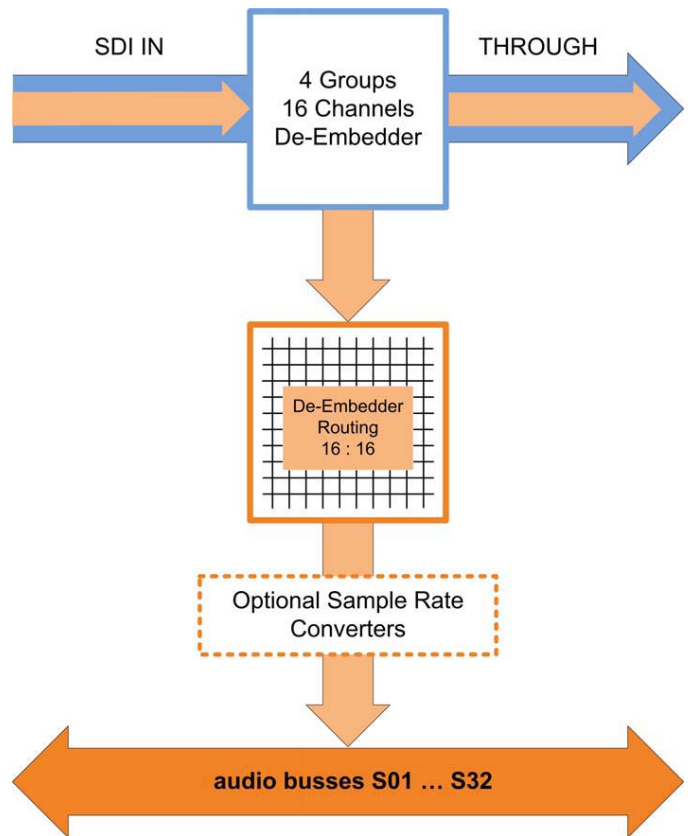
Connector	75 Ω, BNC
Backplane Connector	DIN41612, 64-pin, a+b, male
Power Supply	+5 VDC
Power Consumption	~1000 mA
Dimension	3 RU, 8 HP (2 slots)
Temperature	10–40°C
Humidity	90%, non-condensing

HD944 SDI-Demux (De-embedder)

The HD944 is a 16-channel de-embedder.

Features

- BNC connectors: IN, THROUGH (active loop, re-clocked)
- De-embedder: automatically detects HD/SD signal format; 16 channels out of 4 groups simultaneous; mono routing (8x2-ch) to audio busses.
- Sample Rate Converter: for non-synchronized SDI signals (optional)
- Remote control: using FC972 Remote
- Standalone operation: uses locally set DIP switches
- Master mode: HD944 can be the frame's clock source

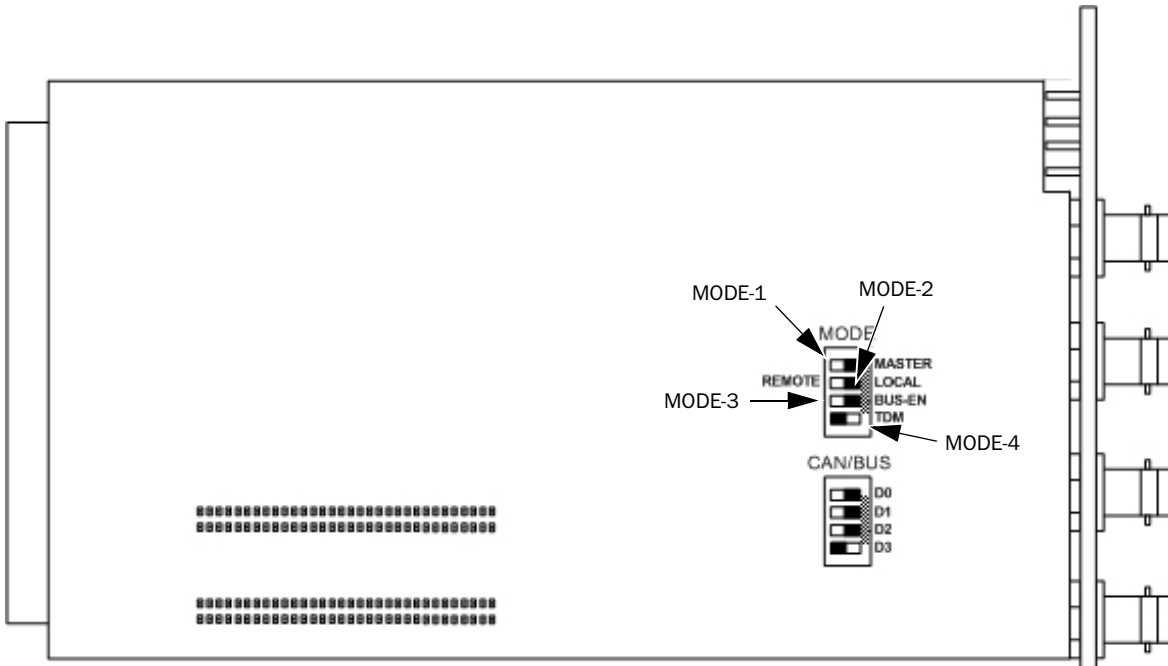


HD944 front panel (left) and block diagram (right)

Installation Considerations

MODE Switches

Push the MODE switches to the right to turn them ON or to the left to turn them OFF.



HD944 installation diagram

Setting BUS-EN

The output configuration is taken from the non-volatile memory.

- MODE-3 ON connects the outputs to the audio busses on power up.
- MODE-3 OFF disconnects the module outputs from the audio busses on power up.



*To avoid audio bus conflicts when installing or replacing a module and the configuration is unknown, disable the output bus drivers by setting **BUS-EN = OFF** before inserting it. If all settings are done remotely and the unit fits into the frame's bus assignment scheme, remove it and set **BUS-EN = ON**.*

Setting MASTER

If this module will be the master sync source in a IO93 or IO94 Frame, it must be placed in a red reserved slot. Select the input to use as clock reference using the web browser interface.

- MODE-1 ON sets this module as clock master for the frame.
- MODE-1 OFF if this module is not clock master for the frame.

Setting REMOTE/LOCAL

The MODE-2 switch must be set to ON (LOCAL).



To avoid overheating, do not place the HD944 close to the power supplies or the frame's side panel.

Setting the CAN ID

Each frame must be fitted with an FC972 Remote to externally configure all modules (except analog line in/out and WC984) and control mic preamps remotely using a web browser. Install only one FC972 per frame and up to two SY983s (for redundant operation, differentiated by Master/Slave setting).

A Module's system ID consists of the **Frame ID + module CAN ID**. The Frame ID is determined by the FC972's IP Address/Subnet/Host Address. The FC972 must be assigned a unique IP Address based on the frame's role within the system. A CAN ID must be set for each externally controllable module. Most modules have 32 CAN ID settings available but the AD914 Remote Mic Pre-amp has 16.

The FC972 and SY983 have default module CAN IDs that do not interfere with those of other modules. The internal CAN bus must be terminated once per frame, either on the FC972 or SY983.

Using the CAN Address switches on the FC972 or SY983 is an older method of setting the Frame ID. An explicit CAN Address must be set only when employing a hardware CAN-BUS remote controller to configure frames. In System 5, the Frame ID is set with the FC972's IP Address for configuration using a web browser interface.

To set the CAN ID in range 0–15:

- 1 Set MODE-4 to OFF.
- 2 Use the CAN/BUS switches D0–D4 to set the CAN ID according to the table below.

To set the CAN ID in range 16–31:

- 1 Set MODE-4 to ON.
- 2 Use the CAN/BUS switches D0–D4 to set the CAN ID according to the table below.

D0	D1	D2	D3	Value	Value + 16
OFF	OFF	OFF	OFF	0x 0 (0)	0x 10 (16)
ON	OFF	OFF	OFF	0x 1 (1)	0x 11 (17)
OFF	ON	OFF	OFF	0x 2 (2)	0x 12 (18)
ON	ON	OFF	OFF	0x 3 (3)	0x 13 (19)
OFF	OFF	ON	OFF	0x 4 (4)	0x 14 (20)
ON	OFF	ON	OFF	0x 5 (5)	0x 15 (21)
OFF	ON	ON	OFF	0x 6 (6)	0x 16 (22)
ON	ON	ON	OFF	0x 7 (7)	0x 17 (23)
OFF	OFF	OFF	ON	0x 8 (8)	0x 18 (24)
ON	OFF	OFF	ON	0x 9 (9)	0x 19 (25)
OFF	ON	OFF	ON	0x A (10)	0x 1A (26)
ON	ON	OFF	ON	0x B (11)	0x 1B (27)
OFF	OFF	ON	ON	0x C (12)	0x 1C (28)
ON	OFF	ON	ON	0x D (13)	0x 1D (29)
OFF	ON	ON	ON	0x E (14)	0x 1E (30)
ON	ON	ON	ON	0x F (15)	0x 1F (31)

Remote Configuration using a Web Browser

The HD944 is configured using a web browser interface, which requires fitting an FC972 Remote in the frame.

 See “FC972 Remote” on page 35.

OVERVIEW Page

This page provides an overview of the frame’s modules. Click the wrench tool to open the configuration pages of that module.

PREMIUM CHANNELS
FRAME NAME

RACK17 TRAY07
FRAME LOCATION

OVERVIEW

OVERVIEW	CONTROLLER C8702	SRC049 C8086	SRC051 C8086	SRC 049 C8402	SRC051 C8402
	SYNC MASTER C8820	SRC050 C8086	C8086 D 18 C8086	SRC050 C8402	MOVIE CHANNEL C8403

CONTROLLER
C8702


SYNC MASTER
C8820

SRC049
C8086 [0]


SRC050
C8086 [1]


SRC051
C8086 [2]


C8086 D 18
C8086 [3]


SRC 049
C8402 [8]


SRC050
C8402 [9]


SRC051
C8402 [A]


MOVIE CHANNEL
C8403 [B]


wrench tool

HD944 Web Configuration Overview page

PRESETS Page

The HD944 has eight Presets, named PRE1 to PRE8 by default. The status area on the left shows the name of the active preset. When a preset parameter is changed, *modified* appears to the left of the preset name until it is saved.



HD944 Web Configuration Presets page

Name

This field displays the Preset’s name. Click the name to enter a new name (four letters or less).

Load

Selecting a Preset name from the Load menu and clicking LOAD NOW loads a new Preset.

Save as #

Selecting a Preset number from the Save as # menu and clicking SAVE NOW saves the current Preset.

Preset Clipboard

Clicking COPY TO CLIPBOARD copies the active Preset to the configuration computer’s clipboard.

Backup Presets to File

Clicking BACKUP saves the eight Presets to a file on the configuration computer.

Restore Presets from File

Clicking RESTORE restores the Presets from a file on the configuration computer.

DEVICE Page

The status area on the left shows the name of the active preset. When a preset parameter is changed, *modified* appears to the left of the preset name until it is saved.

The screenshot shows the 'DEVICE' configuration page for an HD944 device. The left sidebar contains a status area for 'CHANNEL TWO' (C8413, 16 Channel SD/HD De-Embedder) and a 'Preset' section showing 'modified: PRE2'. Below this are 'Video Input' options (SD selected, HD unselected) and 'SRC' status. The main area has tabs for PRESETS, DEVICE, DE-EMBEDDER, SETUP, BUS ROUTING, and GPIO. Under the 'FIRMWARE' section, it shows 'Controller: 59' and 'SDI: 04'. There are buttons for 'CHANGE NAME', 'RESTART', 'INITIALIZE', 'BACKUP', and 'RESTORE'. The 'RESTORE' button is followed by a file input field and a 'Durchsuchen...' button.

HD944 Web Configuration Device page

Device Name

This field displays current name. Click CHANGE NAME to rename the device.

Restart Module

Clicking RESTART initiates a warm start.

Initialize and restore factory defaults

Clicking INITIALIZE restores factory default settings. The input bus assignment are set to S1–S4, the outputs are turned off and the bus drivers are disabled.

FIRMWARE

Controller: Displays the controller's firmware version.

SDI: Displays the SDI firmware version.

Backup Settings and Presets to File

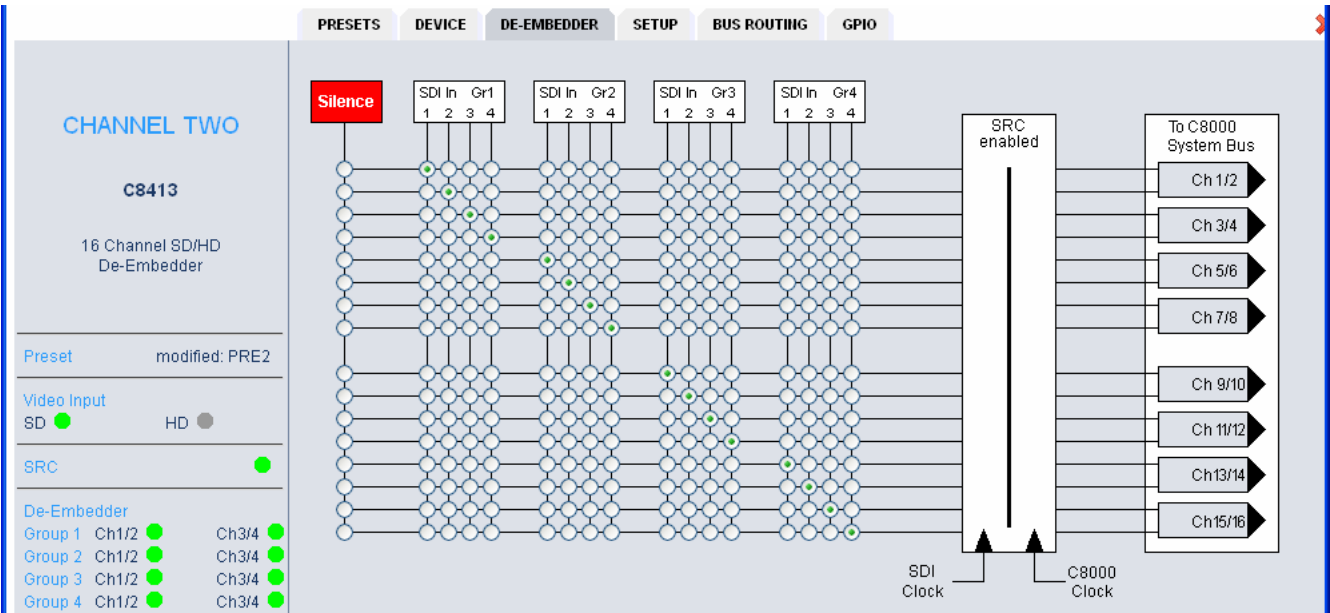
Clicking BACKUP stores all settings and presets to file.

Restore Settings and Presets from File

Clicking RESTORE restores all settings and presets from the selected file/destination.

DE-EMBEDDER Page

This page sets de-embedding parameters for the HD944.



HD944 Web Configuration Device page

Routing Matrix

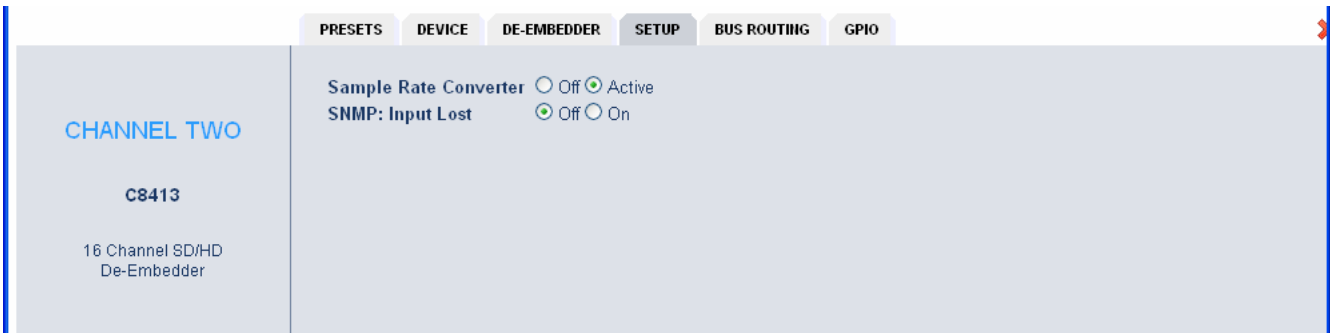
Signals extracted from the SDI data stream can be routed to the audio frame bus. Any of 16 embedded audio channels can be selected in any combination. A Silence source is also provided. These signal pairs (Ch 1/2 to Ch 15/16) are routed to the frame’s audio busses. Routing is performed on the BUS ROUTING Page (see page 128).

Sample Rate Conversion

The SRC LED is lit if the optional sample rate converter option is installed and unlit otherwise. See “SETUP Page” on page 127.

SETUP Page

This page configures setup options for the HD944.



HD944 Web Configuration Setup page

Sample Rate Converters

Select Active to enable SRCs if this option was installed. Sample rate converters must be used if the embedded audio is not synchronized with the frame.

SNMP: Input Lost

Select On to enable the module to generate an SNMP Trap upon loss of input signal. If the module is not being used, select Off to avoid generating false SNMP Traps.

BUS ROUTING Page

This page routes de-embedded channels to the frame's audio busses.

CHANNEL TWO

C8413

16 Channel SD/HD De-Embedder

Preset

modified: PRE2

Video Input

SD ☒ HD ☐

SRC

☒

De-Embedder

Group 1

Ch1/2 ☒ Ch3/4 ☒

Group 2

Ch1/2 ☒ Ch3/4 ☒

Group 3

Ch1/2 ☒ Ch3/4 ☒

Group 4

Ch1/2 ☒ Ch3/4 ☒

PRESETS

DEVICE

DE-EMBEDDER

SETUP

BUS ROUTING

GPIO

From De-Embedder to C8000 Bus

Mux Format

☒ 2CH ☐ 8CH

Ch 1/2

S1

Ch 3/4

S2

Ch 5/6

S3

Ch 7/8

S4

Mux Format

☐ 2CH ☒ 8CH

Ch 9/10

S5

Ch 11/12

S6

Ch 13/14

S7

Ch 15/16

S8

Enable C8000 Bus Driver

☒

HD944 Web Configuration Bus Routing page

MUX Format

Audio signals can be multiplexed in 2ch or 8ch mode. In 8ch mode, only the upper bus assignment field is available

Bus Assign

The channel sources can be assigned to an audio bus (S1–32/Off).

Enable C8000 Bus Driver

This checkbox temporarily overrides the state of the BUS-EN hardware switch (see “Installation Considerations” on page 122). If the BUS-EN switch is Off, busses stay enabled until the next power cycle.

128 Modular I/O Configuration Guide

GPIO Page

If a GPI input is detected by a GPIO module in the system, it puts an associated GPI number on the CAN bus. Each module in a frame monitors for these GPI numbers and performs the programmed action if it reads that number on the CAN bus.

CHANNEL TWO

C8413

16 Channel SD/HD De-Embedder

Preset

modified: PRE2

Video Input

SD HD

SRC

De-Embedder

Group 1

Ch1/2 Ch3/4

Group 2

Ch1/2 Ch3/4

Group 3

Ch1/2 Ch3/4

Group 4

Ch1/2 Ch3/4

PRESETS

DEVICE

DE-EMBEDDER

SETUP

BUS ROUTING

GPIO

GPI

Preset 1

OFF

Preset 2

OFF

Preset 3

OFF

Preset 4

OFF

Preset 5

OFF

Preset 6

OFF

Preset 7

OFF

Preset 8

OFF

GPO

Preset 1

OFF

Preset 2

OFF

Preset 3

OFF

Preset 4

OFF

Preset 5

OFF

Preset 6

OFF

Preset 7

OFF

Preset 8

OFF

Lock

OFF

Async

OFF

HD

OFF

HD944 Web Configuration GPIO page

GPI Preset 1–8

A GPI input can be set to trigger a preset recall.

GPO Preset 1–8

A GPO output can be set to trigger when a preset is recalled.

Lock

A GPO output can be set to trigger when the module is locked.

Async

A GPO output can be set to trigger when the input is asynchronous.

HD

A GPO output can be set to trigger when an HD video input is detected.

 Do not assign the same GPIO numbers to different functions because this incorrectly triggers multiple functions.

Chapter 10: AES I/O and HD Modules 129

Technical Specifications

Audio

Standard	SMPTE 292M: 1.485 GBit HD-SDI SMPTE 259: 270 Mbit SD-SDI
Connector	75 Ω BNC, coaxial (SDI through: active loop reclocked)
Signal Level	800 mV ±10%
Equalization	130 m (Belden 1694A, 1.485 GHz)
Return Loss	>15 dB (1.485 GHz)

Video Standards Supported

HD 720/60	SMPTE 296M	HD 1080/25	SMPTE 274M
HD 720/50	SMPTE 296M	HD 1080/24	SMPTE 274M
HD 720/30	SMPTE 296M	HD 1080/50	SMPTE 295M
HD 720/25	SMPTE 296M	HD 1035/60	SMPTE 260M
HD 720/24	SMPTE 296M		
HD 1080/60	SMPTE 274M	SD 525/59.94	SMPTE 125M
HD 1080/50	SMPTE 274M	SD 625/50	SMPTE 125M
HD 1080/30	SMPTE 274M		

All HD standards are also supported with their 1/1001-frame-rates.

Audio

Standards	SMPTE 272M (SD)/SMPTE 299M (HD)
Audio Data Format	24-Bit, transparent for C-Bit and U-Bit according to AES3
Audio Sample Rate	48 kHz synchronous to video-carrier (SD and HD) 32–48 kHz asynchronous to video-carrier (HD only)
De-embedder Latency	HD: < 400 μs SD: < 1.4 ms
Sample Rate Converter	24-bit, THD < 140 dB

General

Connector	75 Ω, BNC
Backplane Connector	DIN41612, 64-pin, a+b, male
Power Supply	+5 VDC
Power Consumption	~600 mA
Dimension	3 RU, 4 HP (1 slot)
Temperature	10–40°C
Humidity	90%, non-condensing

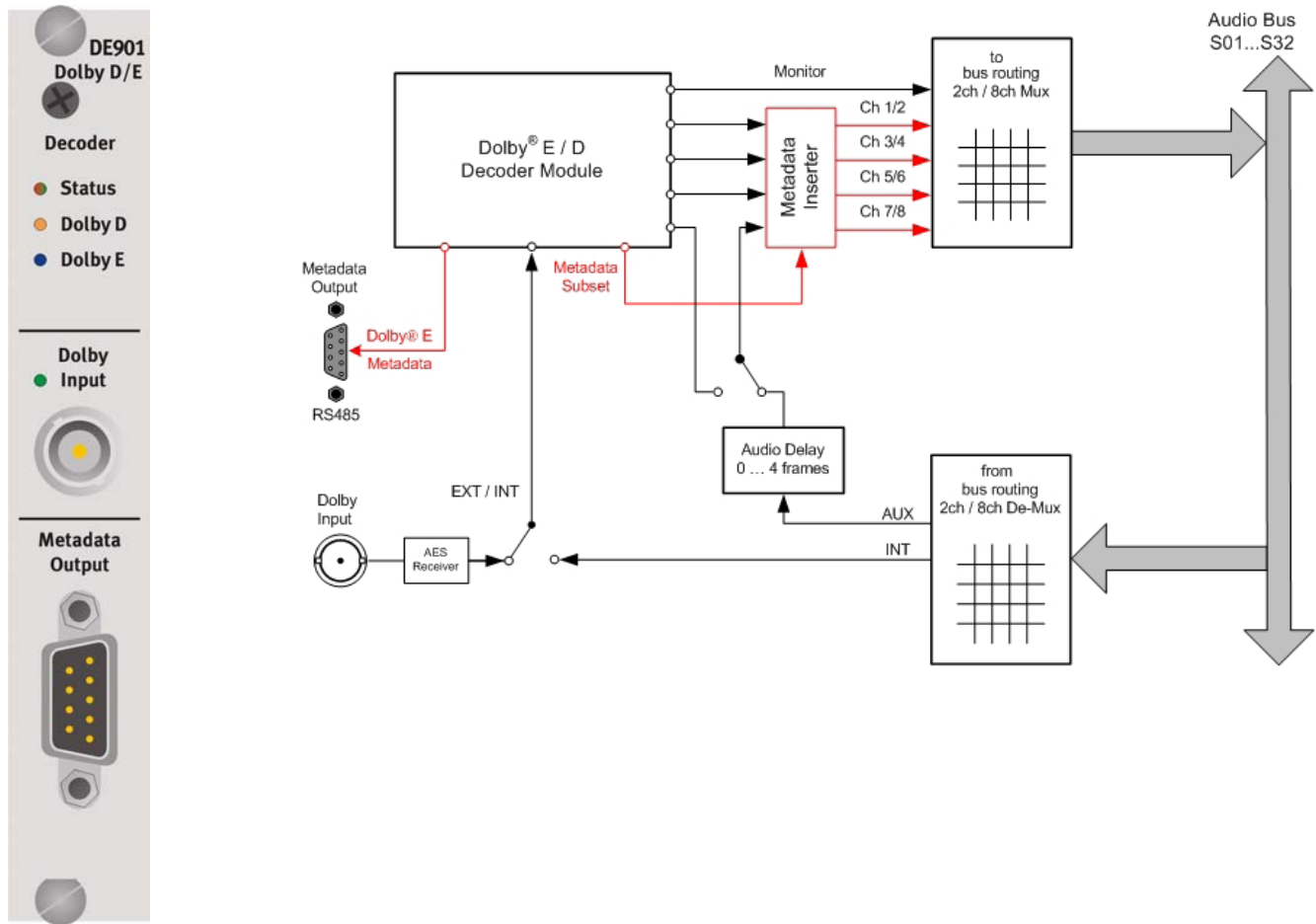
Chapter 11: Dolby D/E Modules

DE901 Dolby D/E Decoder

The DE901 decodes Dolby D/E signals.

Features

- RS485 metadata output
- Unbalanced, asynchronous AES input for Dolby encoded signals
- 16-, 20-, 24-bit audio data format
- Automatic format detection (Dolby E, Dolby D, PCM)
- Unique metadata inserter into audio USER Bits
- Decodes up to eight channels
- Downmix and mono program monitoring
- Program-specific metadata display

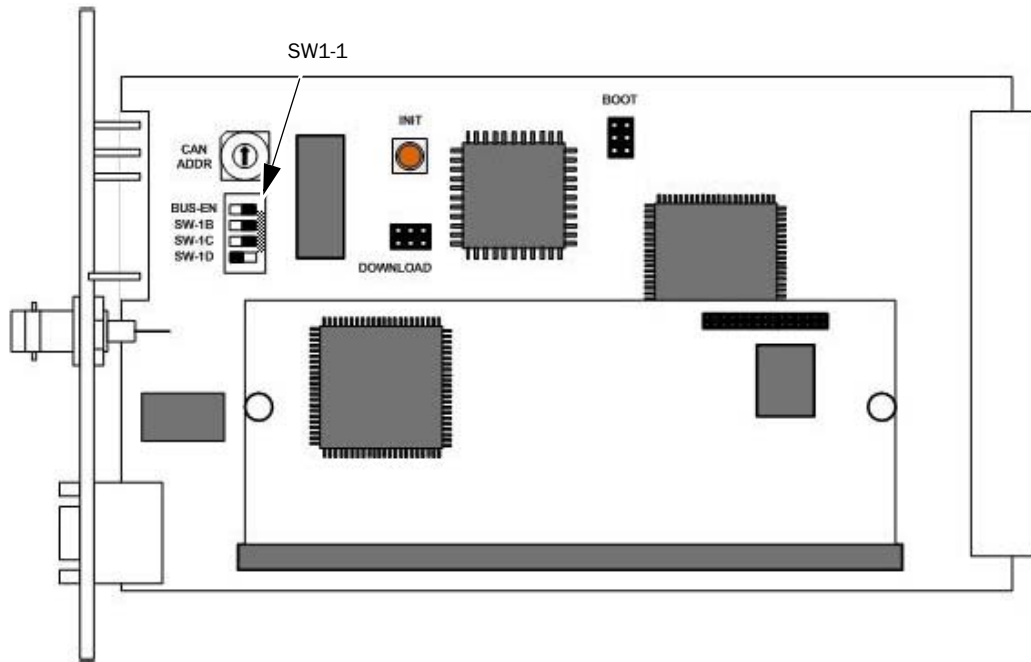


DE901 front panel (left) and block diagram (right)

Installation Considerations

To initialize module parameters to their factory default values, press INIT during power up.

⚠ To avoid damaging analog circuits, install a master sync source module in a red reserved slot before applying AC power.



DE901 installation diagram

SW1-1 Functions

SW1-1 has four DIP switches that enable/disable BUS-EN and help set the CAN ID. SW1-1C and SW1-1D are unused. To set a switch ON, move it to the *right* position.

Setting BUS-EN

The output configuration is taken from the non-volatile memory.

- SW1-1 ON connects the outputs to the audio busses on power up.
- SW1-1 OFF disconnects the module outputs from the audio busses on power up.

💡 To avoid audio bus conflicts when installing or replacing a module and the configuration is unknown, disable the output bus drivers by setting **BUS-EN = OFF** before inserting it. If all settings are done remotely and the unit fits into the frame's bus assignment scheme, remove it and set **BUS-EN = ON**.

Setting the CAN ID

Each frame must be fitted with an FC972 Remote to externally configure all modules (except analog line in/out and WC984) and control mic preamps remotely using a web browser. Install only one FC972 per frame and up to two SY983s (for redundant operation, differentiated by Master/Slave setting).

A Module's system ID consists of the **Frame ID + module CAN ID**. The Frame ID is determined by the FC972's IP Address/Subnet/Host Address. The FC972 must be assigned a unique IP Address based on the frame's role within the system. A CAN ID must be set for each externally controllable module. Most modules have 32 CAN ID settings available but the AD914 Remote Mic Pre-amp has 16.

The FC972 and SY983 have default module CAN IDs that do not interfere with those of other modules. The internal CAN bus must be terminated once per frame, either on the FC972 or SY983.

Using the CAN Address switches on the FC972 or SY983 is an older method of setting the Frame ID. An explicit CAN Address must be set only when employing a hardware CAN-BUS remote controller to configure frames. In System 5, the Frame ID is set with the FC972's IP Address for configuration using a web browser interface.

To set the CAN ID in range 0–15:

- 1 Set SW1-B to OFF.
- 2 Use the CAN Rotary Switch to set the CAN ID.

To set the CAN ID in range 16–31:

- 1 Set SW1-B to ON.
- 2 Use the CAN Rotary Switch to set the CAN ID.

Status LEDs

Green	OK
Red	Bad
Flashing	The module is in focus of the frame controller
Green	Under GUI control

Dolby D LEDs

Red	Reading a proper Dolby D signal
Off	Dolby D decoding error

Dolby E LEDs

Blue	Reading a proper Dolby E signal
Off	Dolby E decoding error

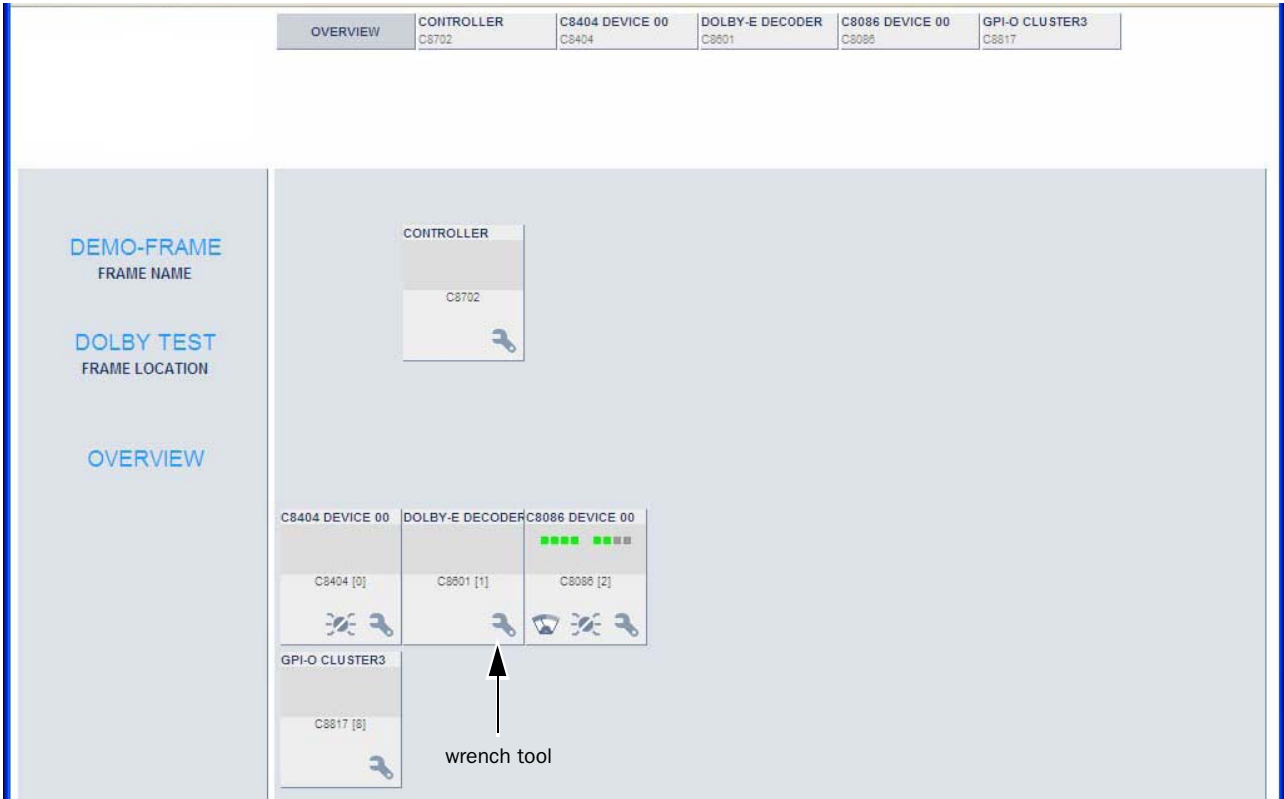
Remote Configuration using a Web Browser

The DE901 is configured using a web browser interface, which requires fitting an FC972 Remote in the frame.

 See “FC972 Remote” on page 35.

OVERVIEW Page

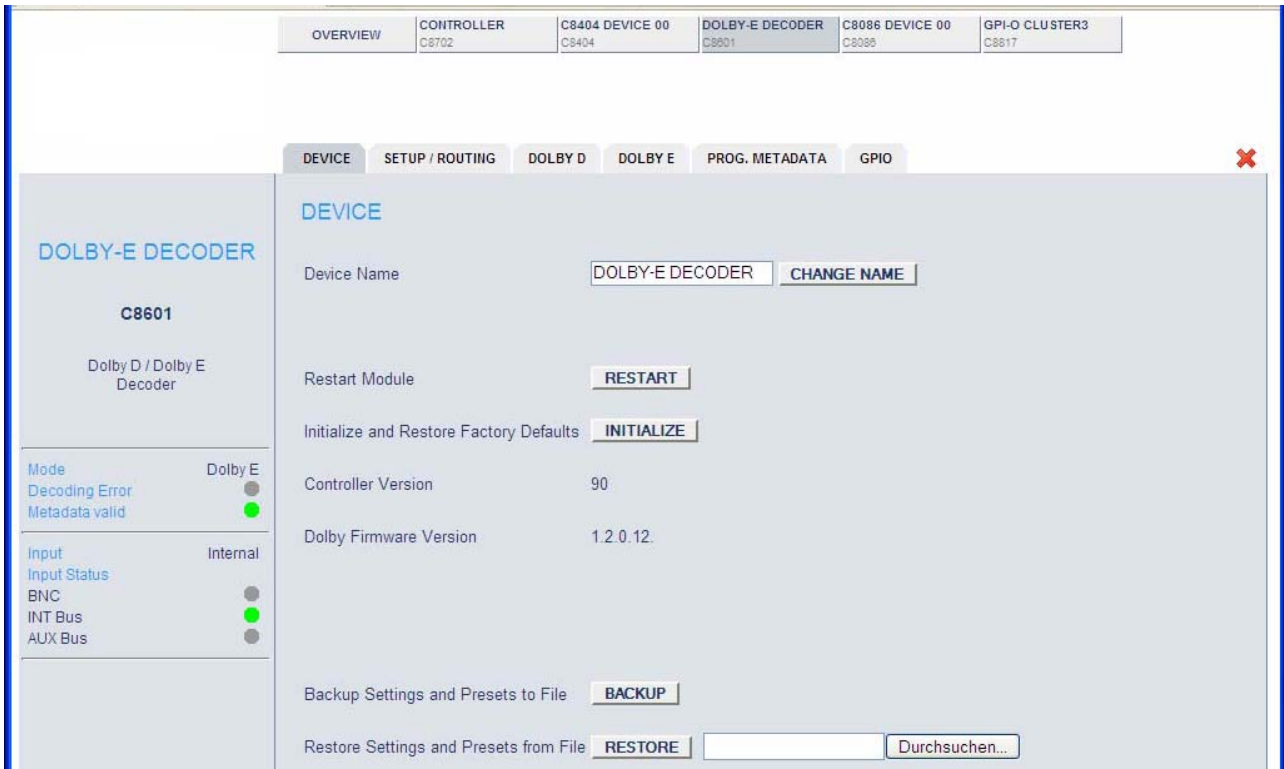
This page provides an overview of the frame’s modules. Click the wrench tool to open the configuration pages of that module.



DE901 Web Configuration Overview page

DEVICE Page

This page configures and displays device-specific information about the DE901



DE901 Web Configuration Device page

Device Name

This field displays the current name. Click CHANGE NAME to rename the device.

Restart Module

Clicking RESTART initiates a warm start.

Initialize and restore factory defaults

Clicking INITIALIZE restores factory default settings. The input bus assignment are set to S1–S4, the outputs are turned off and the bus drivers are disabled.

Controller Version

This displays the module’s firmware version.

Dolby Firmware Version

This displays the version of the Dolby piggyback version.

Backup all settings to File

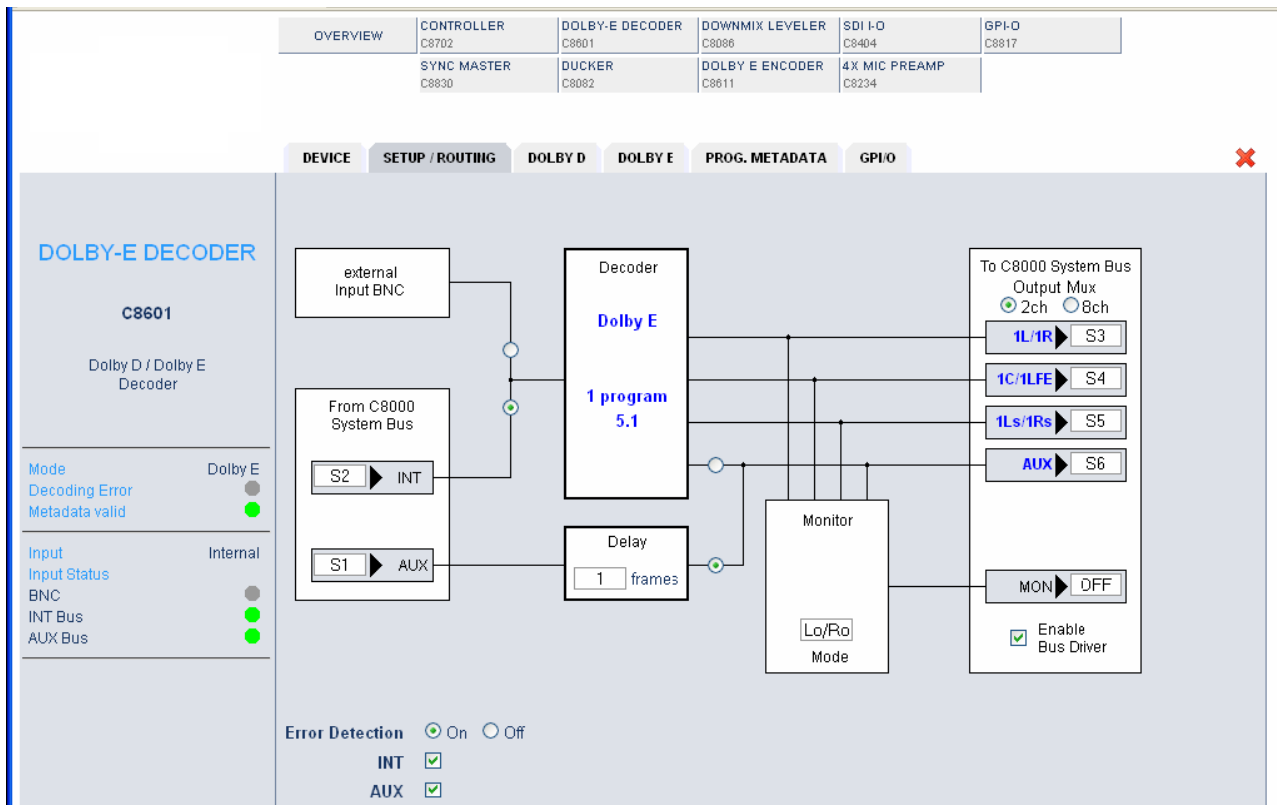
Clicking BACKUP stores all settings to file.

Restore all settings from File

Clicking RESTORE restores all settings from the selected file/destination.

SETUP/ROUTING Page

This page configures the module's audio bus routing.



DE901 Web Configuration Setup/Routing page

Decoder Input

The decoder input can be set to:

external Input BNC

– or –

INT From C8000 System Bus.

Decoder

This displays the format of the incoming stream: Dolby E, Dolby D, PCM. The SETUP/ROUTING page above shows a Dolby E stream containing two programs (5.1 + 2).

AUX Input

An AUX input is provided for a PCM signal that may incur Dolby decoding delay.

Delay

A delay can be applied to an independent digital audio signal (PCM) to compensate for upstream processing or for decoding delay.

To C8000 System Bus

Select this option to assign the outputs of the decoder to the frame's audio busses (S1–S32/Off).

Output Mux

The signals to the audio busses may be multiplexed in 2ch or 8ch mode. In 8ch mode, only one bus selector is available for each of the two eight-channel sections.

Enable Bus Driver

To disable the output drivers, de-select Enable Bus Driver.

 *The bus selector labels show the signal configuration of the decoder output lines. Downstream equipment must be configured the same way.*

Monitor

The decoder has a monitor output that depends on the stream being decoded. Select a monitor mode to suit the program.

5.1-channel signals can have the following modes: Mute, Mono, Lt/Rt, Lo/Ro.

Error Detection

The serial audio data from the frame bus can be monitored to properly position an Error-Flag. A bad Error-Flag indicates a disturbance upstream (i.e., input signal, input module, other DSP module). Error Detection is a global selection but the INT and AUX options can enable error detection for specific bus inputs. The status of the busses is displayed on LEDS on the left.

Grey	Error detection disabled
Green	No error detected
Red	Error condition

Bus Status

The bus status, as well as the external Input (BNC) status, may be presented to external monitoring systems using SNMP. The frame controller summarizes such status information and generates SNMP traps for the frame as an entity or may activate GPOs (if GPIO module(s) are installed). The SNMP manager may later poll the module’s Status for more detailed status information per input.

 *See “SNMP Functions Setup” on page 62.*

DOLBY E Page

Basic program data for Dolby E decoding is displayed on this page. Program-specific Metadata is displayed on the PROG. META-DATA Page (see page 139).

OVERVIEW

CONTROLLER
C8702

DOLBY-E DECODER
C8601

DOWNMIX LEVELER
C8086

SDI I/O
C8404

GPI-O
C8817

SYNC MASTER
C8930

DUCKER
C8082

DOLBY E ENCODER
C8611

4X MIC PREAMP
C8234

DEVICE

SETUP / ROUTING

DOLBY D

DOLBY E

PROG. METADATA

GPI/O

DOLBY-E DECODER

C8601

Dolby D / Dolby E Decoder

Mode

Dolby E

Decoding Error

Metadata valid

Input

Internal

Input Status

BNC

INT Bus

AUX Bus

Program Config

5.1

Bitstream Format

Dolby E 16 Bit

Frame Rate

25 Hz (PAL)

Program Description Text

Prog 1

Test check

DE901 Web Configuration Dolby E page

Program Config

This field displays program mode.

Bitstream Format

This field displays the bitstream format read by the encoder at the input.

Frame Rate

This field displays the frame rate of the Dolby frames (boundaries of encoded data blocks).

Program Description Text

This is a description of the encoded program(s).

 A full explanation of the Dolby Metadata system is beyond the scope of this manual. We recommend studying the “Dolby Metadata Guide” and other publications available from Dolby (www.dolby.com).

PROG. METADATA Page

These metadata values are for display only. The fields are grey to show the content cannot be changed.

DOLBY-E DECODER

C8601

Dolby D / Dolby E Decoder

Mode

Dolby E

Decoding Error

Metadata valid

Input

Internal

Input Status

BNC

INT Bus

AUX Bus

General

Data Rate

Channel Mode

Bitstream Mode

Original Bitstream

Copyright

Dynamic Range Control

Dialnorm

Profile Line Mode

Profile RF Mode

Filter

DC-High Pass

Low Pass

RF Overmod Protect

Surround 3 dB Attenuation

Surround Phase Shift

Downmix

Nominal Center Mix Level

Nominal Surround Mix Level

Preferred Downmix Mode

Lo/Ro Center Mix Level

Lo/Ro Surround Mix Level

Lt/Rt Center Mix Level

Lt/Rt Surround Mix Level

1L,R,C,LFE,Ls,Rs

prog 1

unspec kbps

3/2

C. Main

☒

☒

-31 dBFS

Film St

Film St

☒

☒

☒

☒

☐

-3.0 dB

-3.0 dB

Lt/Rt

-3.0 dB

off dB

-3.0 dB

off dB

LFE ☒

LFE Low Pass ☐

(Downmix to Stereo)

(Downmix to Dolby ProLogic)

DE901 Web Configuration Prog. Metadata page

GPIO Page

If a GPI input is detected by a GPIO module in the system, it puts an associated GPI number on the CAN bus. Each module in a frame monitors for these GPI numbers and performs the programmed action if it reads that number on the CAN bus.

DOLBY-E DECODER

C8601

Dolby D / Dolby E Decoder

Mode

Dolby E

Decoding Error

Metadata valid

Input

Internal

Input Status

BNC

INT Bus

AUX Bus

GPI

External

OFF

GPO

External

OFF

Dolby E

OFF

Dolby D

OFF

PCM

OFF

Input Error

OFF

Metadata Error

OFF

DE901 Web Configuration GPIO page

GPI: External

A GPI can be set to trigger the module's External mode.

GPO: External, Dolby E, Dolby D, PCM, Input Error, Metadata Error

A GPO output can be set to trigger when these conditions are detected.

💡 Do not assign the same GPIO numbers to different functions because this incorrectly triggers multiple functions.

Technical Specifications

External synchronization is possible using SY983 (PAL, NTSC, HD) if Dolby E decoding must be frame-accurate.

External input

Connector	BNC
Impedance	75 Ω
Signal Level	0, 1–2.5 Vpp
Standard	AES3, SMPTE 276M unbalanced
Data Format	16-, 20-, 24-bit
Sample Rate	32–48 kHz

Input audio formats

Dolby E	16-, 20-, 24-bit streams, 48 kHz
Dolby Digital	16 or 32-bit streams, 32–48 kHz

Latency

Dolby E	1 video frame
Dolby Digital	32 ms
PCM	< 10 ms

Metadata Output

Format	Standard Dolby Metadata stream (RS485) according to SMPTE RDD 6-2008
Baud Rate	115.2 kbps
Connector	male 9-pin D-Sub

General

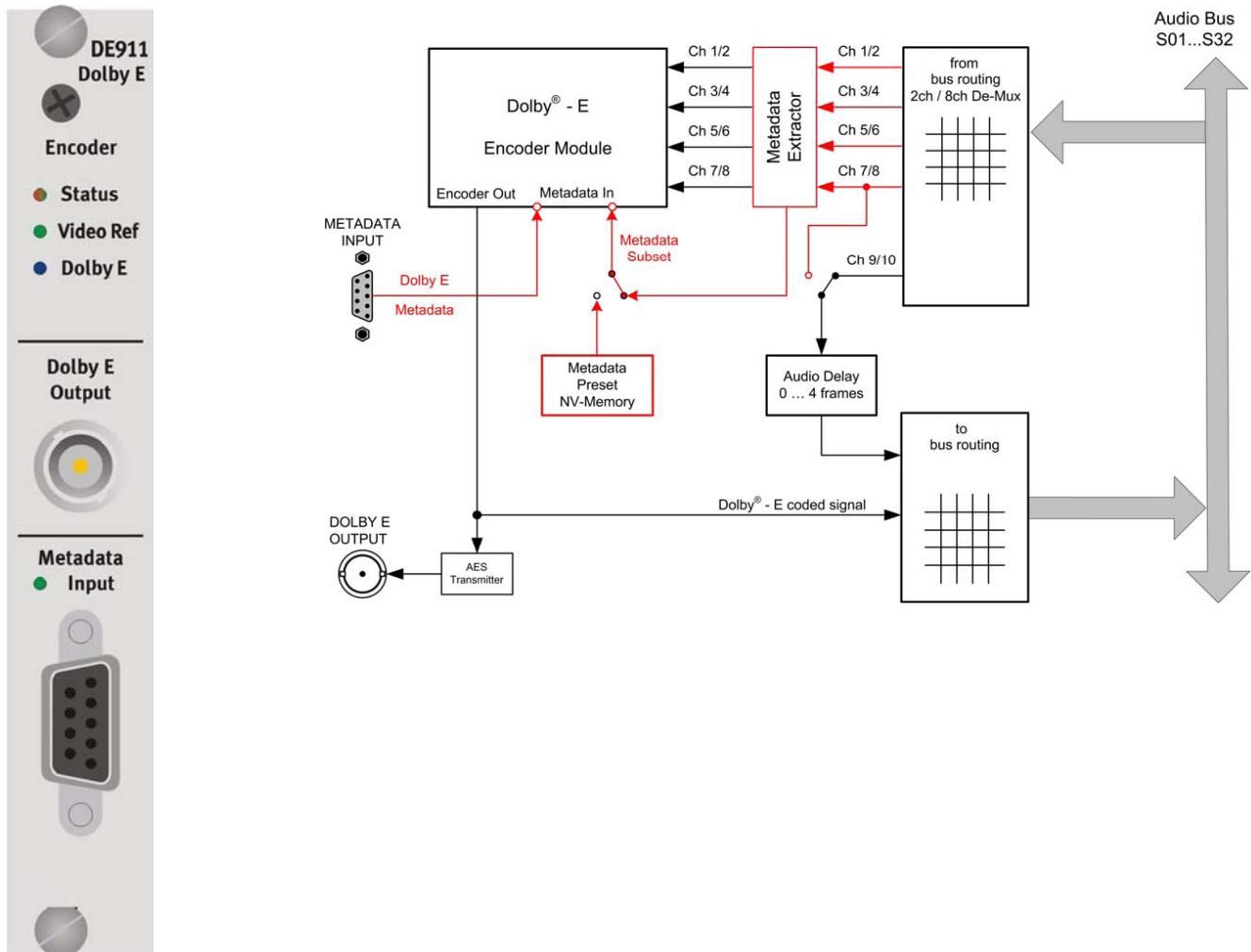
Connector	75 Ω , BNC
Backplane Connector	DIN41612, 64-pin, a+b, male
Power Supply	+5 VDC
Power Consumption	~500 mA
Dimension	3 RU, 4 HP (1 slot)
Temperature	10–40°C
Humidity	90%, non-condensing

DE911 Dolby E Encoder

The DE911 encodes Dolby E signals.

Features

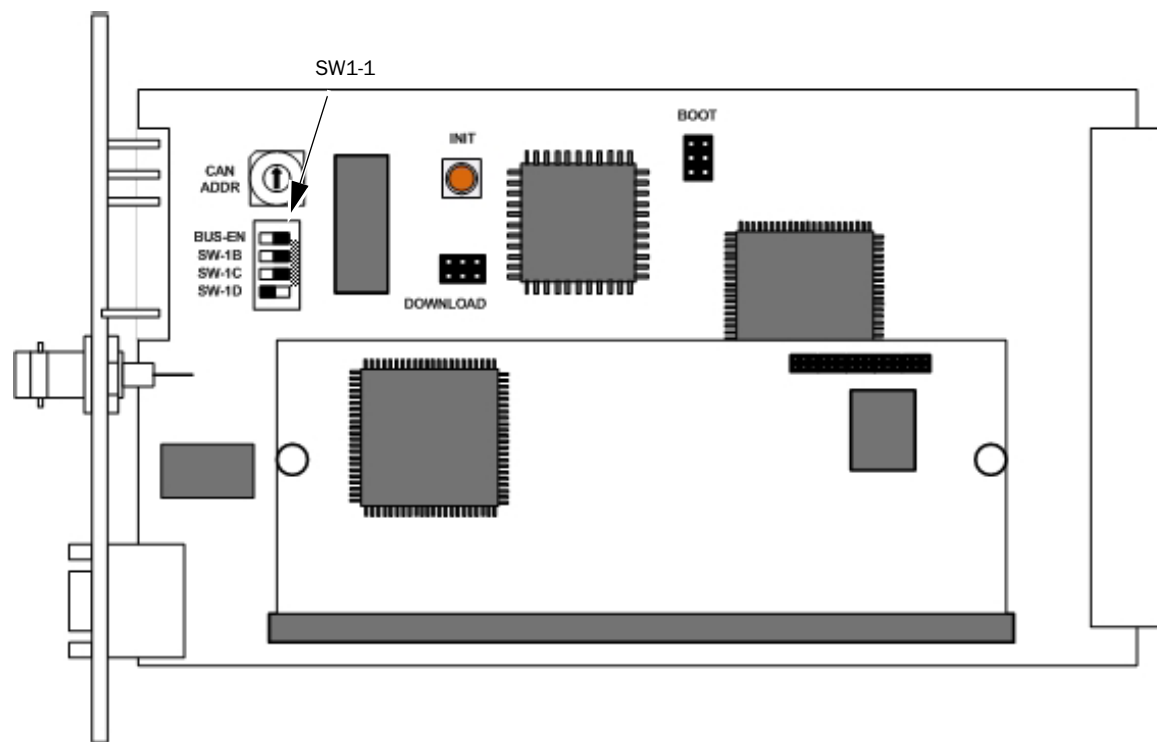
- Dolby E compliant Encoder
- Eight channels (up to eight programs)
- Audio input resolution: 16-, 20-, or 24-bit; 32–48 kHz
- RS485 metadata input
- Metadata extractor reads metadata inserted into PCM audio User Bits
- Metadata read from frame's internal audio bus, external RS485 input, or presets
- Eight metadata presets
- Dolby metadata display and editing
- Encoded output stream available on frame's internal audio bus and unbalanced AES output
- Remote control (web interface) using FC972 Remote



DE911 front panel (left) and block diagram (right)

Installation Considerations

To initialize module parameters to their factory default values, press INIT during power up.



DE911 installation diagram

SW1-1 Functions

SW1-1 has four DIP switches that enable/disable BUS-EN and help set the CAN ID. SW1-1C and SW1-1D are unused. To set a switch ON, move it to the *right* position.

Setting BUS-EN

The output configuration is taken from the non-volatile memory.

- SW1-1 ON connects the outputs to the audio busses on power up.
- SW1-1 OFF disconnects the module outputs from the audio busses on power up.

 To avoid audio bus conflicts when installing or replacing a module and the configuration is unknown, disable the output bus drivers by setting **BUS-EN = OFF** before inserting it. If all settings are done remotely and the unit fits into the frame's bus assignment scheme, remove it and set **BUS-EN = ON**.

Setting the CAN ID

Each frame must be fitted with an FC972 Remote to externally configure all modules (except analog line in/out and WC984) and control mic preamps remotely using a web browser. Install only one FC972 per frame and up to two SY983s (for redundant operation, differentiated by Master/Slave setting).

A Module's system ID consists of the **Frame ID + module CAN ID**. The Frame ID is determined by the FC972's IP Address/Subnet/Host Address. The FC972 must be assigned a unique IP Address based on the frame's role within the system. A CAN ID must be set for each externally controllable module. Most modules have 32 CAN ID settings available but the AD914 Remote Mic Pre-amp has 16.

The FC972 and SY983 have default module CAN IDs that do not interfere with those of other modules. The internal CAN bus must be terminated once per frame, either on the FC972 or SY983.

Using the CAN Address switches on the FC972 or SY983 is an older method of setting the Frame ID. An explicit CAN Address must be set only when employing a hardware CAN-BUS remote controller to configure frames. In System 5, the Frame ID is set with the FC972’s IP Address for configuration using a web browser interface.

To set the CAN ID in range 0–15:

- 1 Set SW1-B to OFF.
- 2 Use the CAN Rotary Switch to set the CAN ID.

To set the CAN ID in range 16–31:

- 1 Set SW1-B to ON.
- 2 Use the CAN Rotary Switch to set the CAN ID.

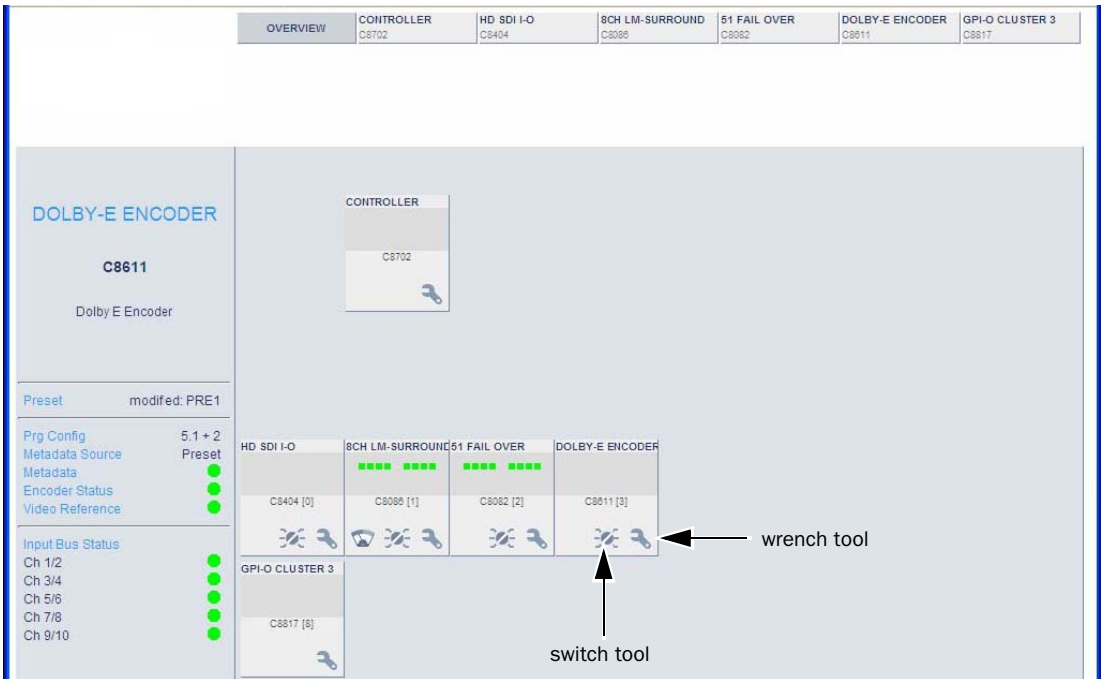
Remote Configuration using a Web Browser

The DE911 is configured using a web browser interface, which requires fitting an FC972 Remote in the frame.

 See “FC972 Remote” on page 35.

OVERVIEW Page

This page provides an overview of the frame’s modules. Click the wrench tool to open the configuration pages of that module. Click the switch tool to open the PRESETS Page directly.



DE911 Web Configuration Overview page

PRESETS Page

The DE911 has eight Presets, named PRE1 to PRE8 by default. The status area on the left shows the name of the active preset. When a preset parameter is changed, *modified* appears to the left of the preset name until it is saved.

DE911 Web Configuration Presets page

Name

This field displays the Preset's name. Click the name to enter a new name (four letters or less).

Load

Selecting a Preset name from the Load menu and clicking LOAD NOW loads a new Preset.

Save as

Selecting a Preset number from the Save as # menu and clicking SAVE NOW saves the current Preset.

Preset Clipboard

Clicking COPY TO CLIPBOARD copies the active Preset to the configuration computer's clipboard.

Backup Presets to File

Clicking BACKUP saves the eight Presets to a file on the configuration computer.

Restore Presets from File

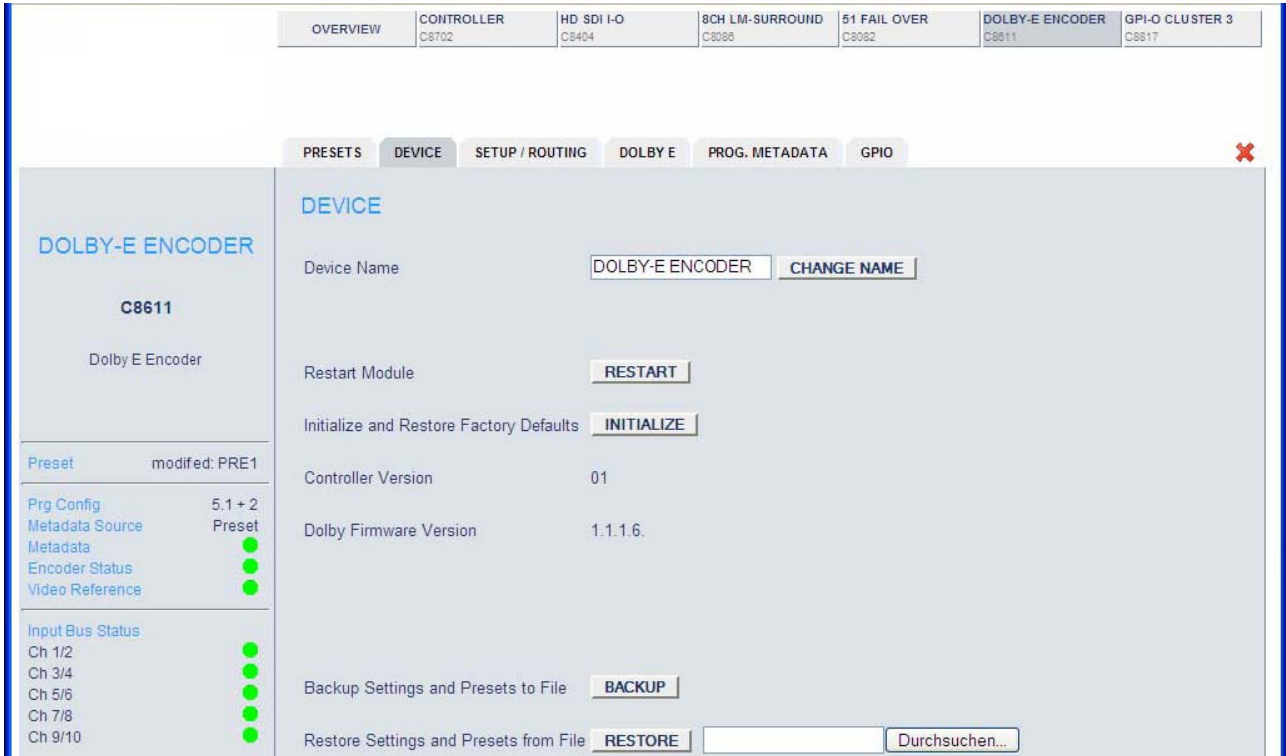
Clicking RESTORE restores the Presets from a file on the configuration computer.



Settings from the DOLBY E and PROG. METADATA pages are stored in Presets.

DEVICE Page

This page displays and configures device-specific parameters. The status area on the left shows the name of the active preset. When a preset parameter is changed, *modified* appears to the left of the preset name until it is saved.



DE911 Web Configuration Device page

Device Name

This field displays current name. Click CHANGE NAME to rename the device.

Restart Module

Clicking RESTART initiates a warm start.

Initialize and restore factory defaults

Clicking INITIALIZE restores factory default settings. The input bus assignment are set to S1–S4, the outputs are turned off and the bus drivers are disabled.

Controller Version

This displays the module’s firmware version.

Dolby Firmware Version

This displays the Dolby firmware version.

Backup Settings and Presets to File

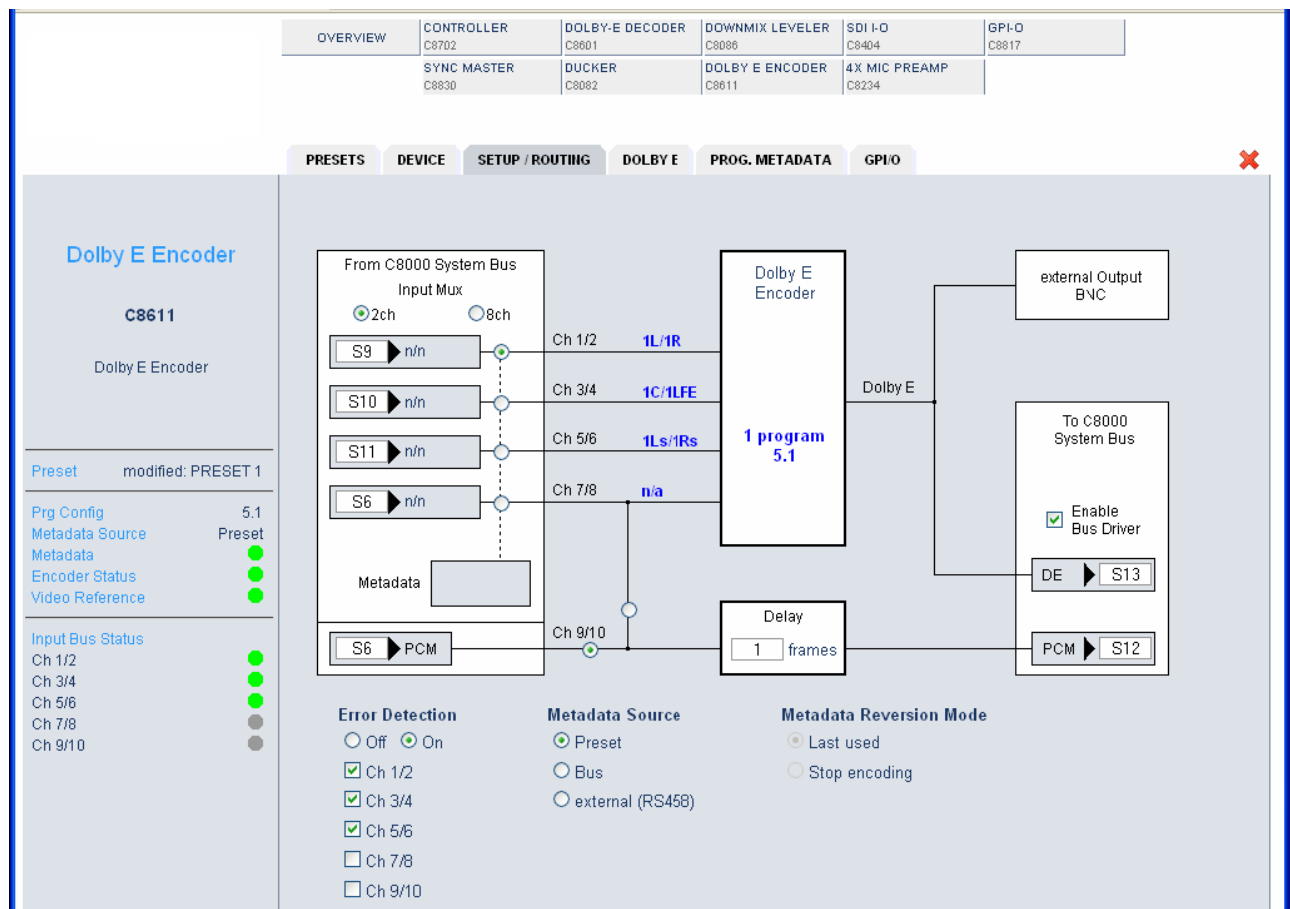
Clicking BACKUP stores all settings and presets to file.

Restore Settings and Presets from File

Clicking RESTORE restores all settings and presets from the selected file/destination.

SETUP/ROUTING Page

This page configures the module’s audio bus routing.



DE911 Web Configuration Setup/Router page

From C8000 System Bus

This assigns audio busses to the encoder for their respective signals. The labels at the encoder input show which signals the encoder expects due to its configuration determined by PROGRAM CONFIG (see page 138). If the eight input signals are multiplexed in 8ch mode, make sure the source module is also configured to output in 8ch mode.

Input Mux

The input signal format can be set to 8ch or 2ch.

Metadata

Metadata may be inserted in the USER bits of the PCM signal(s) on the frame’s audio busses. Select the audio bus from which metadata should be read.

PCM

A delay can be applied to an independent signal selected from the bus (PCM or encoded).

Delay

A two-channel delay (up to 4 frames) is provided to compensate for the Dolby E encoding delay.

To C8000 System Bus

This assigns the encoder output to the frame’s busses and to the external BNC output.

Enable Bus Driver

De-selecting Enable Bus Driver disables the output drivers.

External Output BNC

The Dolby E-encoded bit stream is sent out over an unbalanced AES3 output in parallel to the audio bus.

Metadata Source

Preset

The program’s metadata and setup parameters for each encoder are defined manually and can be saved in a Preset. A Preset can be loaded, edited and saved.

Bus

Metadata for the Dolby E encoder is extracted from the USER bits in Metadata Subset format of one of the incoming PCM signals.

External (RS485)

Metadata for the Dolby E encoder is received by the 9-pin D-Sub connector at the front side of the module in Dolby E format.

Error Detection

The serial audio data from the frame bus can be monitored to properly position an Error-Flag. A bad Error-Flag indicates a disturbance upstream (i.e., input signal, input module, other DSP module). Error Detection is activated globally but specific bus inputs can be enabled for error detection (Ch 1/2, Ch 3/4, Ch 5/6, Ch 7/8, Ch 9/10). The status of the busses is displayed on LEDS on the left.

Grey	Error detection disabled
Green	No error detected
Red	Error condition

Bus Status

The bus status, as well as the external Input (BNC) status, may be presented to external monitoring systems using SNMP. The frame controller summarizes such status information and generates SNMP traps for the frame as an entity or may activate GPOs (if GPIO module(s) are installed). The SNMP manager may later poll the module’s Status for more detailed status information per input.

 See “SNMP Functions Setup” on page 62.

Metadata Reversion Mode

In case a metadata error occurs, select a method to continue reading metadata.

LAST USED

Encoding continues with the parameters last used.

Stop Encoding

The encoding process stops.

DOLBY E Page

This page displays basic program data for Dolby E encoding.

OVERVIEW

CONTROLLER
C8702

8CH MIX MATRIX
C8088

DRS2 UKW PD 1
C8007

HD SDI I-O
C8404

C841X DEVICE 1C
C8413

C8601 DEVICE 0B
C8601

C8082 DEVICE 05
C8082

C8189 DEVICE 00
C8189

C8611 DEVICE 7
C8611

C8817 DEVICE 00
C8817

PRESETS

DEVICE

SETUP / ROUTING

DOLBY E

PROG. METADATA

GPI/O

C8611 DEVICE 7

C8611

Dolby E Encoder

Preset

Prg Config
Metadata Source
Metadata
Encoder Status
Video Reference

5.1 + 2
Preset
●
●
●

Input Bus Status

Ch 1/2
Ch 3/4
Ch 5/6
Ch 7/8
Ch 9/10

●
●
●
●
●

Program Config

5.1 + 2

Bitstream Format
● 20 Bit ○ 16 Bit Dolby E

Frame Rate
25 Hz (PAL)

Latency Reduction
32 Samples

Program Description Text

Prog 1
German Original
APPLY

Prog 2
English Commentary
APPLY

DE911 Web Configuration Dolby E page

The table below shows the Dolby E parameters and their possible values.

Parameter	Values
Program Configuration	5.1+2, 5.1+2x1, 4+4, 4+2x2, 4+2+2x1, 4+4x1, 4x2, 3x2+2x1, 2x2+4x1, 2+6x1, 8x1, 5.1, 4+2, 4+2x1, 3x2, 2x2+2x1, 2+4x1, 6x1, 7.1, 7.1SCRN
Dolby E Bitstream Format	16-, 20-bit
Frame Rate	None, 23.98 Hz, 24 Hz, 25 Hz (PAL), 29.97 Hz (NTSC), 30 Hz, 59.94 Hz, 60 Hz
Latency Reduction (Dolby E alignment)	0–32 samples; moves the beginning of the Dolby E frame towards the start of the video frame
Program Description Text	32-character text coded program

💡 A full explanation of the Dolby Metadata system is beyond the scope of this manual. We recommend studying the “Dolby Metadata Guide” and other publications available from Dolby (www.dolby.com).

PROG. METADATA Page

The PROG. METADATA page contains the Dolby E Encoder metadata parameters.

OVERVIEW

CONTROLLER
C8702
SYNC MASTER
C8830

DOLBY-E DECODER
C8601
DUCKER
C8082

DOWNMIX LEVELER
C8086
DOLBY E ENCODER
C8611

SDI I-O
C8404
4X MIC PREAMP
C8234

GPI-O
C8817

PRESETS

DEVICE

SETUP / ROUTING

DOLBY E

PROG. METADATA

GPI-O

Dolby E Encoder

C8611

Dolby E Encoder

Preset

modified: PRESET 1

Prg Config

Metadata Source

Metadata

Encoder Status

Video Reference

5.1 + 2

Preset

Input Bus Status

Ch 1/2

Ch 3/4

Ch 5/6

Ch 7/8

Ch 9/10

1L,R,C,LFE,Ls,Rs
prog 1

2L,2R
prog 2

General

Data Rate

448 kbps

Channel Mode

3/2

Bitstream Mode

C. Main

Original Bitstream

☒

Copyright

☐

Dynamic Range Control

Dialnorm

-31 dBFS

Profile Line Mode

None

Profile RF Mode

None

Filter

DC-High Pass

☒

Low Pass

☒

RF Overmod Protect

☐

Surround 3 dB Attenuation

☐

Surround Phase Shift

☐

Downmix

Nominal Center Mix Level

-3.0 dB

Nominal Surround Mix Level

-3.0 dB

Preferred Downmix Mode

Lo/Ro

Lo/Ro Center Mix Level

-3.0 dB

Lo/Ro Surround Mix Level

off dB

Lt/Rt Center Mix Level

-3.0 dB

Lt/Rt Surround Mix Level

off dB

LFE ☒

LFE Low Pass ☒

(Downmix to Stereo)

(Downmix to Dolby ProLogic)

DE911 Web Configuration Prog. Metadata page

The table on the next page is an example for two programs. The Data Rate depends on the Channel Mode; some Channel Modes require a minimum Data Rate.

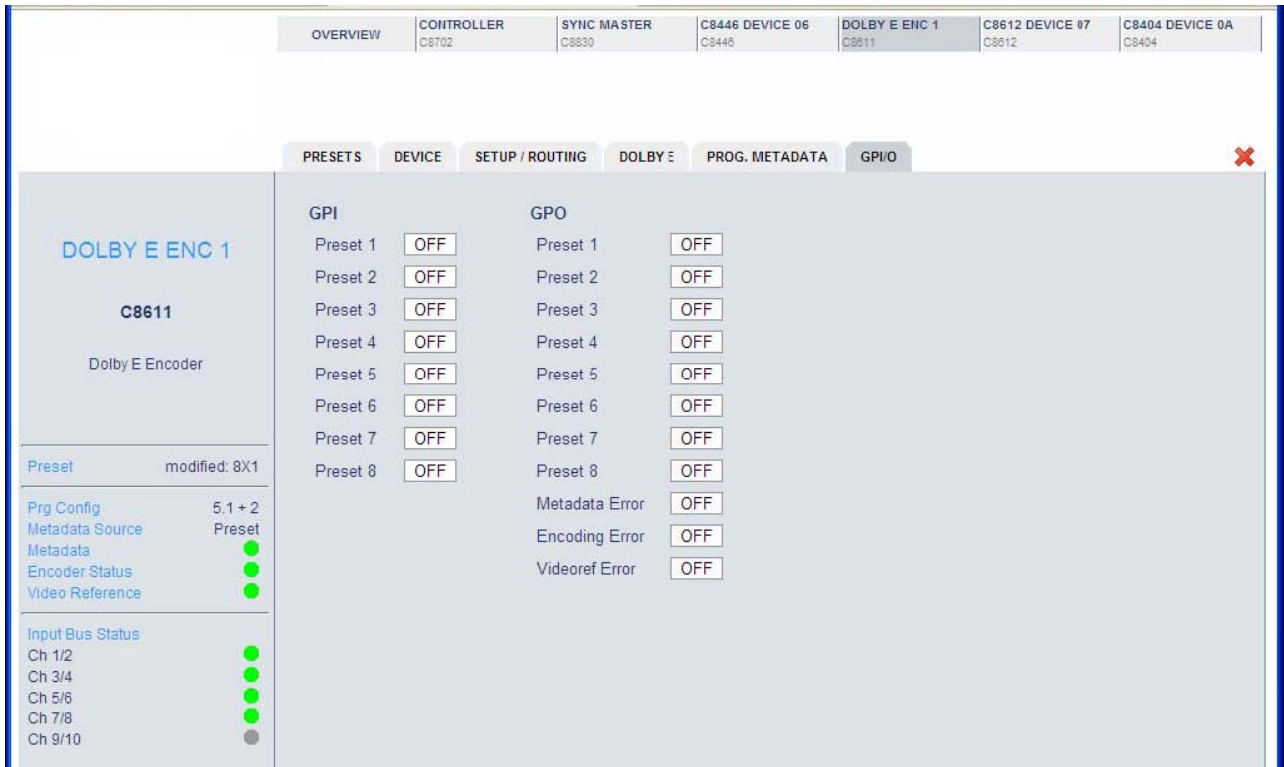
 A full explanation of the Dolby Metadata system is beyond the scope of this manual. We recommend studying the “Dolby Metadata Guide” and other publications available from Dolby (www.dolby.com).

Dolby Digital Metadata For DE911 Encoders

Parameter	Values – Program 1	Values – Program 2
General		
Data Rate (kbps)	32, 40, 48, 56, 64, 80, 96, 112, 128, 160, 192, 224, 256, 320, 384, 448, 512, 576, 640, unspecified	32, 40, 48, 56, 64, 80, 96, 112, 128, 160, 192, 224, 256, 320, 384, 448, 512, 576, 640, unspecified
Channel Mode	1+1, 1/0, 2/0, 3/0, 2/1, 3/1, 2/2, 3/2	1+1, 1/0, 2/0
LFE	OFF, ON	N/A
Bit Stream Mode	C, Main, Mus Eff, Vis. Imp., H. Imp., Dialog, Comment, Emerg., Karaoke	C, Main, Mus Eff, Vis. Imp., H. Imp., Dialog, Comment, Emerg., Karaoke
Original Bit Stream	OFF, ON	OFF, ON
Copyright	OFF, ON	OFF, ON
Dynamic Range Control		
Dialog Normalization	-1 dBFS to -31 dBFS	-1 dBFS to -31 dBFS
Profile Line Modes	None, Film St., Film Lt., Mus. St., Mus. Lt., Speech	None, Film St., Film Lt., Mus. St., Mus. Lt., Speech
Profile RF Mode	None, Film St., Film Lt., Mus. St., Mus. Lt., Speech	None, Film St., Film Lt., Mus. St., Mus. Lt., Speech
Filter		
DC-Highpass	OFF, ON	OFF, ON
Low Pass	OFF, ON	OFF, ON
LFE Low Pass	OFF, ON	N/A
RF Overmod. Prot.	OFF, ON	OFF, ON
Surround -3dB	OFF, ON	N/A
Surround Phase Shift	OFF, ON	N/A
Downmix		
Nominal Center Mix Level	-3 dB, -4.5 dB, -6 dB	N/A
Nominal Surr. Mix Level	-3 dB, -6 dB, Off	N/A
Preferred Downmix Mode	Not indicated, Lt/Rt, Lo/Ro	N/A
Lo/Ro Center Mix Level	Off, -6 dB, -4.5 dB, -3 dB, -1.5 dB, 0 dB, 1.5 dB, 3 dB	N/A
Lo/Ro Surr. Mix Level	Off, -6 dB, -4.5 dB, -3 dB, -1.5 dB, 0 dB, 1.5 dB, 3 dB	N/A
Lt/Rt Center Mix Level	Off, -6 dB, -4.5 dB, -3 dB, -1.5 dB, 0 dB, 1.5 dB, 3 dB	N/A
Lt/Rt Surr. Mix Level	Off, -6 dB, -4.5 dB, -3 dB, -1.5 dB, 0 dB, 1.5 dB, 3 dB	N/A

GPIO Page

If a GPIO input is detected by a GPIO module in the system, it puts an associated GPIO number on the CAN bus. Each module in a frame monitors for these GPIO numbers and performs the programmed action upon reading that number on the CAN bus.



DE911 Web Configuration GPIO page

GPIO: PRESET 1–8

A GPIO can be set to trigger a module Preset.

GPO: PRESET 1–8

A GPO can be set to trigger when a module Preset is recalled.

GPO: Videoref Error, Encoding Error, Metadata Error

A GPO output can be set to trigger when these conditions are detected.

 Do not assign the same GPIO numbers to different functions because this incorrectly triggers multiple functions.

Technical Specifications

External input

Connector	BNC
Impedance	75 Ω
Signal Level	0, 1–2.5 Vpp
Standard	AES3, SMPTE 276M unbalanced
Data Format	16-, 20-, 24-bit
Sample Rate	32–48 kHz

Output audio formats

Dolby E	16-, 20-bit, 48 kHz
Latency	1 video frame

Metadata Input

Format	Standard Dolby Metadata stream (RS485)
Baud Rate	115.2 kbps
Connector	male 9-pin D-Sub

General

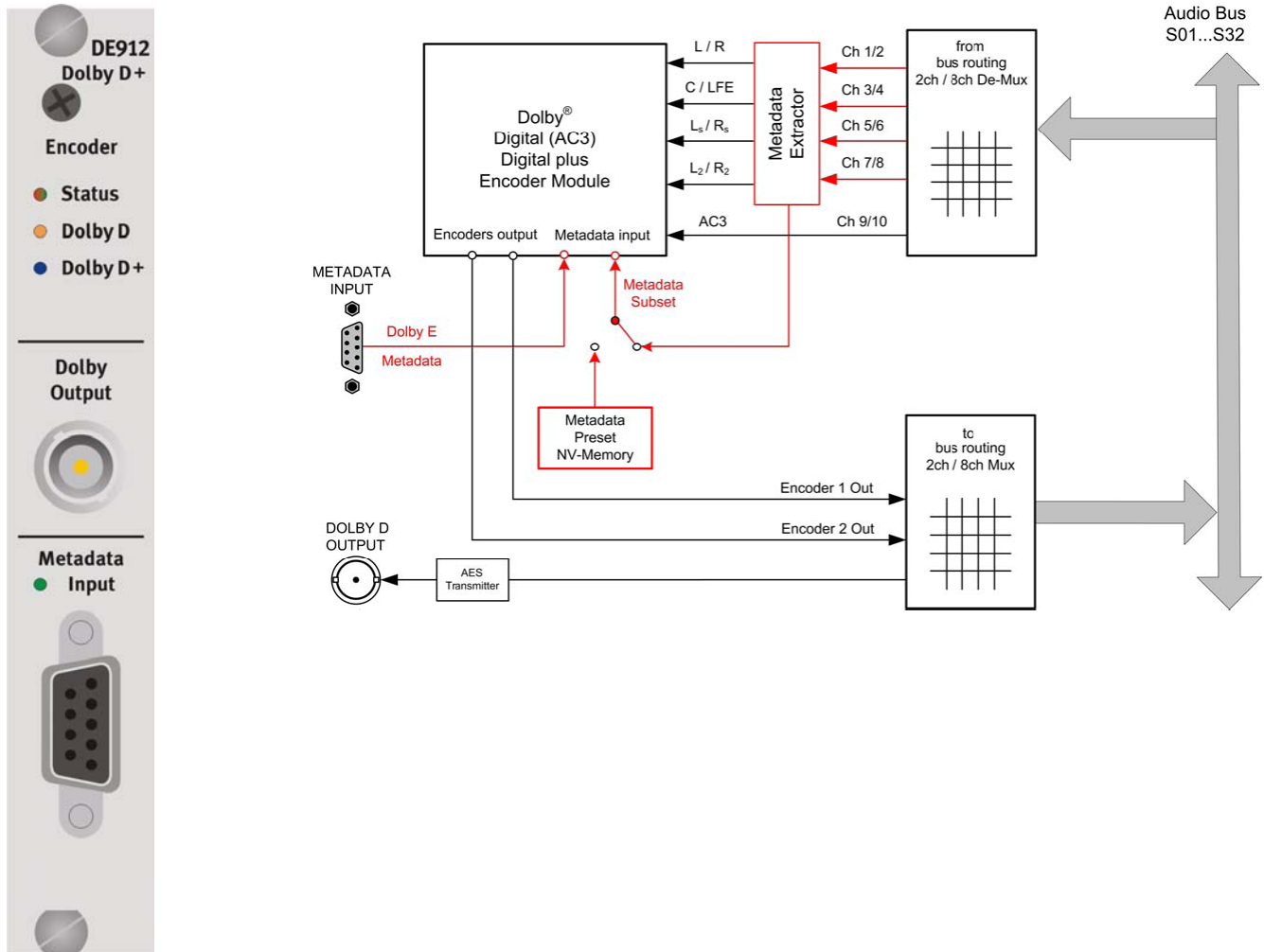
Connector	75 Ω , BNC
Backplane Connector	DIN41612, 64-pin, a+b, male
Power Supply	+5 VDC
Power Consumption	~600 mA
Dimension	3 RU, 4 HP (1 slot)
Temperature	10–40°C
Humidity	90%, non-condensing

DE912 Dolby D/D+ Encoder

The DE912 encodes Dolby D/D+ signals.

Features

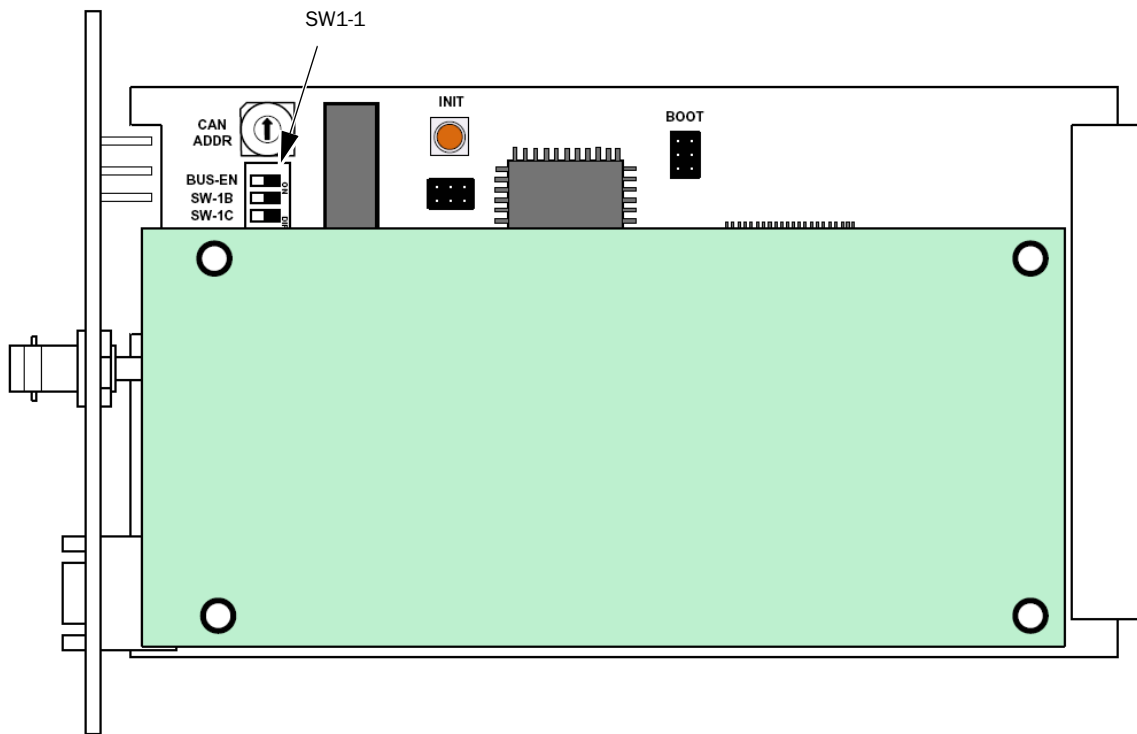
- Fully compliant Dolby Digital (AC-3) or Dolby Digital+ Encoder
- Independent 5.1- and 2.0-channel encoders
- 5.1 transcoder from Dolby Digital (AC-3) to Dolby Digital+
- 16-, 20-, 24-bit audio input data format
- RS485 metadata input
- Metadata selectable from audio/external inputs or presets
- Unique metadata extractor gathers metadata from frame's audio busses
- Eight metadata presets
- Dolby metadata display and editing
- Encoded output stream available on internal bus and BNC
- Dolby encoded signals on unbalanced, AES output
- Remote control (web interface) using FC972 Remote



DE912 front panel (left) and block diagram (right)

Installation Considerations

To initialize module parameters to their factory default values, press INIT during power up.



DE912 installation diagram

SW1-1 Functions

SW1-1 has four DIP switches that enable/disable BUS-EN and help set the CAN ID. SW1-1C is unused. To set a switch ON, move it to the *right* position.

Setting BUS-EN

The output configuration is taken from the non-volatile memory.

- SW1-1 ON connects the outputs to the audio busses on power up.
- SW1-1 OFF disconnects the module outputs from the audio busses on power up.



*To avoid audio bus conflicts when installing or replacing a module and the configuration is unknown, disable the output bus drivers by setting **BUS-EN** = **OFF** before inserting it. If all settings are done remotely and the unit fits into the frame's bus assignment scheme, remove it and set **BUS-EN** = **ON**.*

Setting the CAN ID

Each frame must be fitted with an FC972 Remote to externally configure all modules (except analog line in/out and WC984) and control mic preamps remotely using a web browser. Install only one FC972 per frame and up to two SY983s (for redundant operation, differentiated by Master/Slave setting).

A Module's system ID consists of the **Frame ID + module CAN ID**. The Frame ID is determined by the FC972's IP Address/Subnet/Host Address. The FC972 must be assigned a unique IP Address based on the frame's role within the system. A CAN ID must be set for each externally controllable module. Most modules have 32 CAN ID settings available but the AD914 Remote Mic Pre-amp has 16.

The FC972 and SY983 have default module CAN IDs that do not interfere with those of other modules. The internal CAN bus must be terminated once per frame, either on the FC972 or SY983.

Using the CAN Address switches on the FC972 or SY983 is an older method of setting the Frame ID. An explicit CAN Address must be set only when employing a hardware CAN-BUS remote controller to configure frames. In System 5, the Frame ID is set with the FC972's IP Address for configuration using a web browser interface.

To set the CAN ID in range 0–15:

- 1 Set SW1-B to OFF.
- 2 Use the CAN Rotary Switch to set the CAN ID.

To set the CAN ID in range 16–31:

- 1 Set SW1-B to ON.
- 2 Use the CAN Rotary Switch to set the CAN ID.

Status LEDs

Green	OK
Red	Bad
Flashing	The module is in focus of the frame controller
Green	Under GUI control

Dolby D LEDs

Green	Proper signal detected for Dolby D encoding
Off	Dolby D encoding error

Dolby D+ LEDs

Blue	Encoding a proper Dolby D+ signal
Off	Dolby D+ encoding error

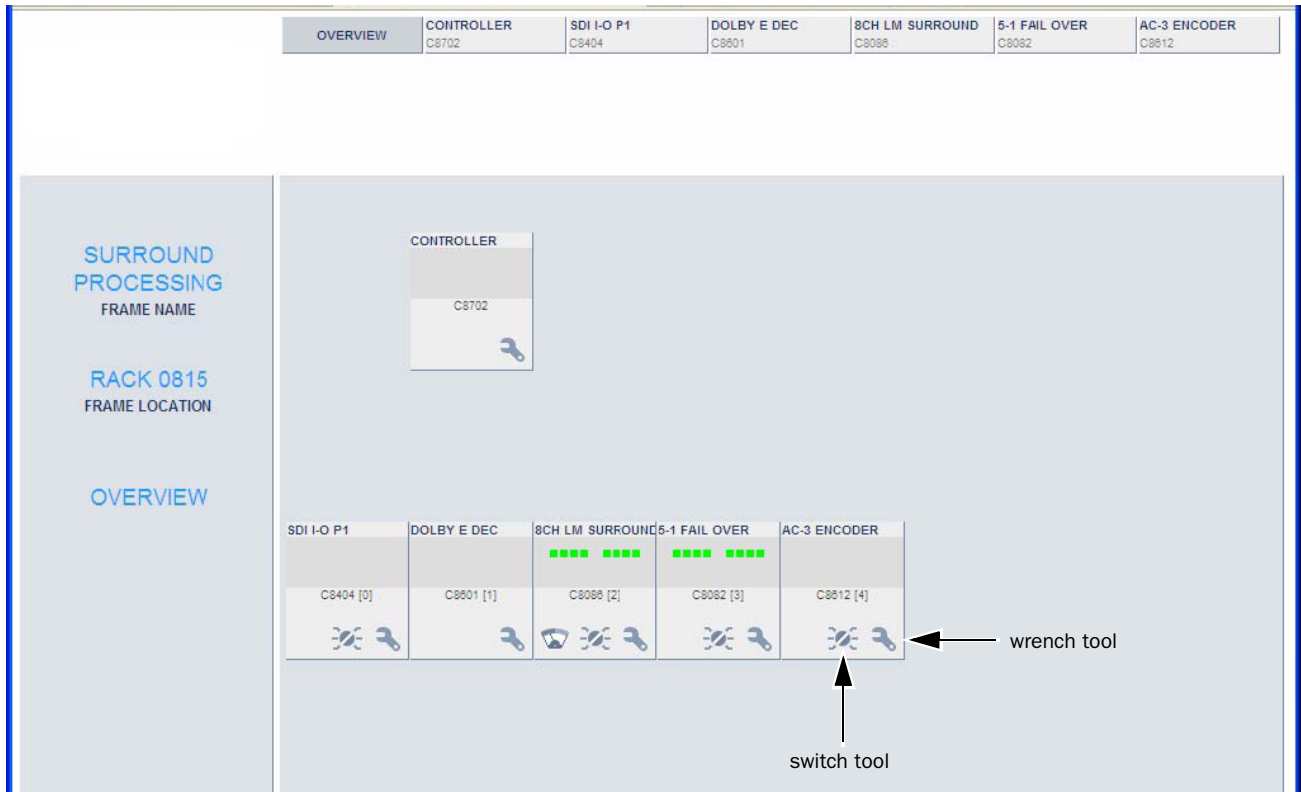
Remote Configuration using a Web Browser

The DE912 is configured using a web browser interface, which requires fitting an FC972 Remote in the frame.

 See “FC972 Remote” on page 35.

OVERVIEW Page

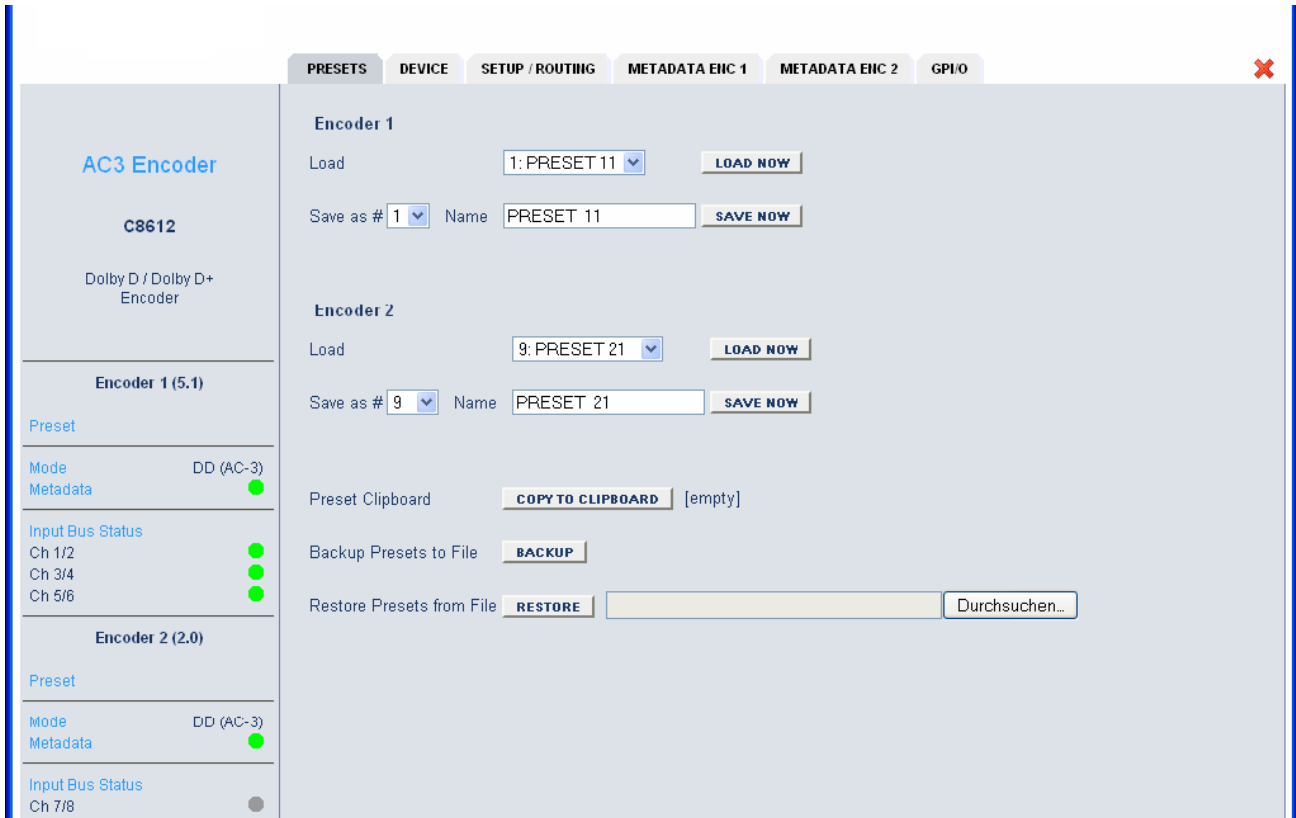
This page provides an overview of the frame’s modules. Click the wrench tool to open the configuration pages of that module. Click the switch tool to open the PRESETS Page directly.



DE912 Web Configuration Overview page

PRESETS Page

The DE912 has eight Presets, named PRE1 to PRE8 by default. The status area on the left shows the name of the active preset. When a preset parameter is changed, *modified* appears to the left of the preset name until it is saved.



DE912 Web Configuration Presets page

Name

This field displays the Preset’s name. Click the name to enter a new name (four letters or less).

Load

Selecting a Preset name from the Load menu and clicking LOAD NOW loads a new Preset.

Save as #

Selecting a Preset number from the Save as # menu and clicking SAVE NOW saves the current Preset.

Preset Clipboard

Clicking COPY TO CLIPBOARD copies the active Preset to the configuration computer’s clipboard.

Backup Presets to File

Clicking BACKUP saves the eight Presets to a file on the configuration computer.

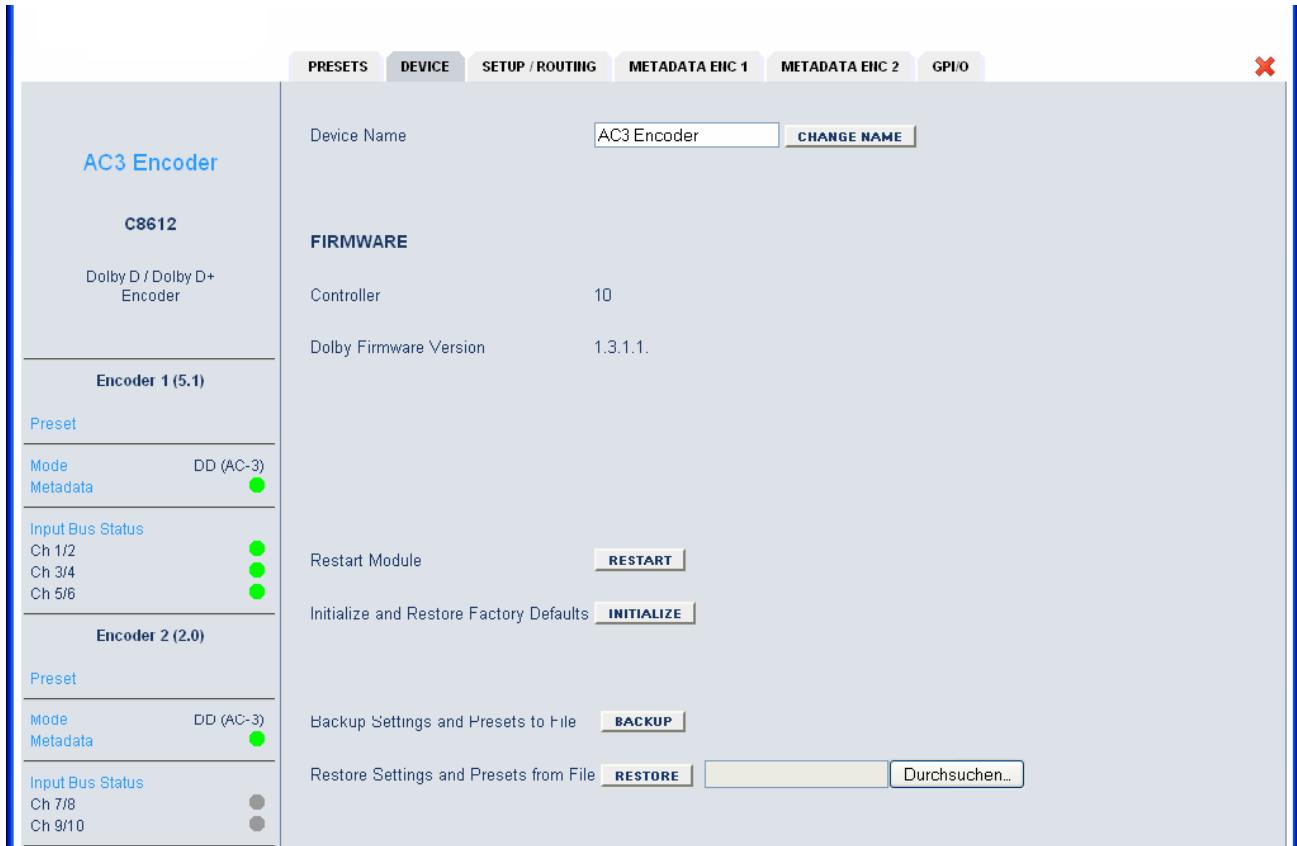
Restore Presets from File

Clicking RESTORE restores the Presets from a file on the configuration computer.

 Settings from the DOLBY E and PROG. METADATA pages are stored in Presets.

DEVICE Page

This page displays and configures device-specific parameters. The status area on the left shows the name of the active preset. When a preset parameter is changed, *modified* appears to the left of the preset name until it is saved.



DE912 Web Configuration Device page

Device Name

This field displays current name. Click CHANGE NAME to rename the device.

Restart Module

Clicking RESTART initiates a warm start.

Initialize and restore factory defaults

Clicking INITIALIZE restores factory default settings. The input bus assignment are set to S1–S4, the outputs are turned off and the bus drivers are disabled.

Controller Version

This displays the module’s firmware version.

Dolby Firmware Version

This displays the Dolby firmware version.

Backup Settings and Presets to File

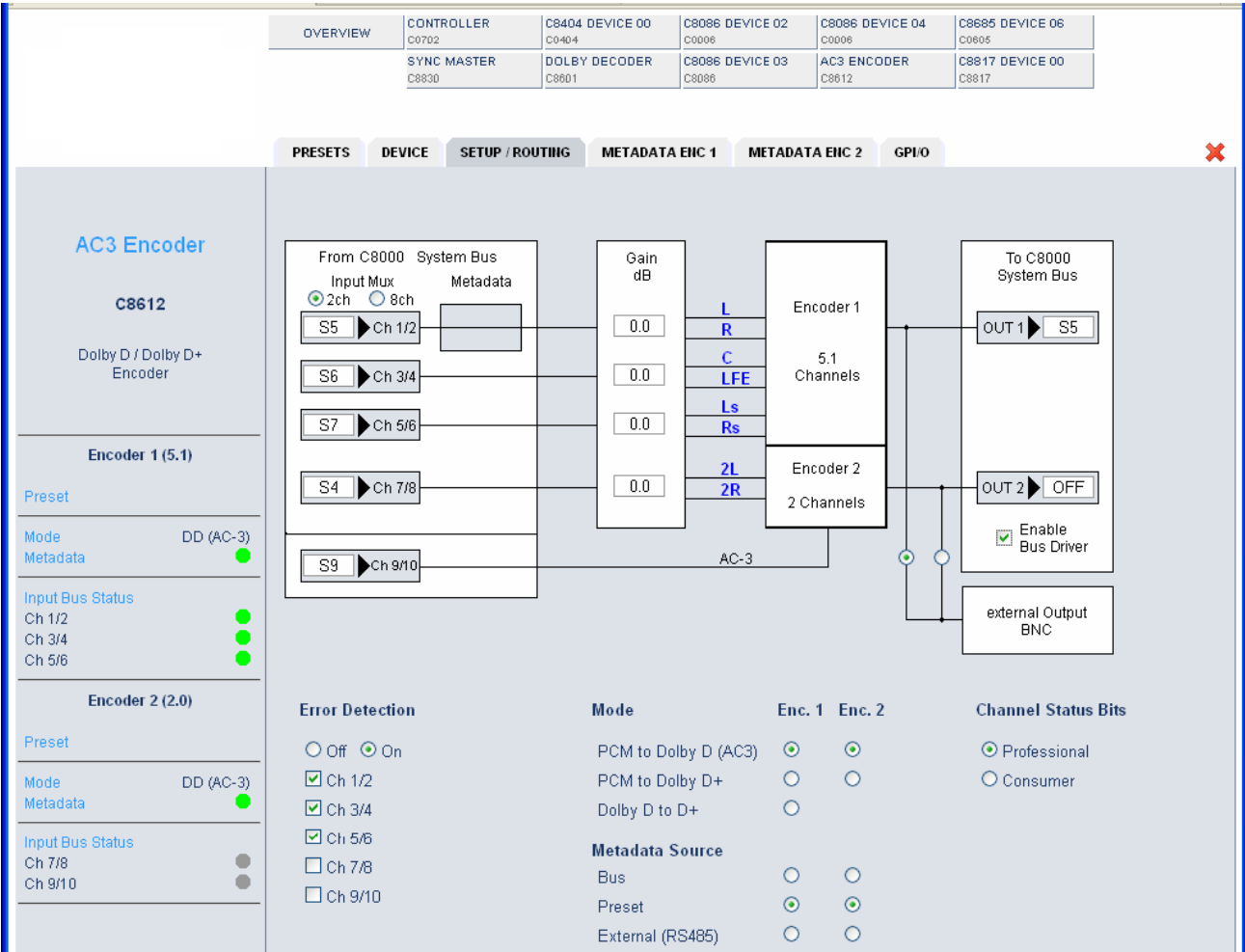
Clicking BACKUP stores all settings and presets to file.

Restore Settings and Presets from File

Clicking RESTORE restores all settings and presets from the selected file/destination.

SETUP/ROUTING Page

This page configures the module’s audio bus routing.



DE912 Web Configuration Setup/Routing page

From C8000 System Bus

This assigns audio busses to the encoder for their respective signals. The encoder input labels show the configuration of signals the encoder expects. For example, if the eight input signals are multiplexed in 8ch mode, make sure the source module is also configured to output in 8ch mode.

Metadata

Metadata may be inserted in the USER bits of the PCM signal(s) on the frame’s audio busses. Select the audio bus from which metadata should be read.

Input Mux

The input signal format can be set to 8ch or 2ch.

AC-3

An AC-3 signal may be provided on the Ch 9/10 source for D-to-D+ transcoding.

Gain

This field sets the gain to the encoders.

To C8000 System Bus

This assigns the encoder output to the frame’s busses and to the external BNC output.

Enable Bus Driver

De-selecting Enable Bus Driver disables the output drivers.

Mode

The Dolby module offers the following operating modes for both encoders:

- PCM encoding to Dolby D or Dolby D+
- Dolby D-to-D+ transcoding.

Metadata Source

Preset

The program’s metadata and setup parameters for each encoder are defined manually and can be saved in a Preset. A Preset can be loaded, edited and saved.

Bus

Metadata for the encoder is extracted from the USER bits in Metadata Subset format of one of the incoming PCM signals.

External (RS485)

Metadata for the encoder is received by the 9-pin D-Sub connector on the front of the module.

Error Detection

The serial audio data from the frame bus can be monitored to properly position an Error-Flag. A bad Error-Flag indicates a disturbance upstream (i.e., input signal, input module, other DSP module). Error Detection is activated globally but specific bus inputs can be enabled for error detection (Ch 1/2, Ch 3/4, Ch 5/6, Ch 7/8, Ch 9/10). The status of the busses is displayed on LEDS on the left.

Grey	Error detection disabled
Green	No error detected
Red	Error condition

Bus Status

The bus status, as well as the external Input (BNC) status, may be presented to external monitoring systems using SNMP. The frame controller summarizes such status information and generates SNMP traps for the frame as an entity or may activate GPOs (if GPIO modules are installed). The SNMP manager may later poll the module’s status for more detailed information per input.

 See “SNMP Functions Setup” on page 62.

Channel Status Bits

Select Professional or Consumer status bits for bus outputs OUT1 and OUT2 and the BNC output.

METADATA ENC 1 Page

The METADATA ENC 1 Page adjusts metadata parameters if the Metadata Source for the encoder is set to Preset on the SETUP/ROUTING Page. In Preset mode, Extended Bitstream Information is enabled. In this case the Nominal Center and Surround Mix Level are mapped from the Lo/Ro parameters.

If the Metadata Source is set to Bus, it is possible to manually overwrite the Data Rate value.

 A full explanation of the Dolby Metadata system is beyond the scope of this manual. We recommend studying the “Dolby Metadata Guide” and other publications available from Dolby (www.dolby.com).

OVERVIEW	CONTROLLER	C8404 DEVICE 00	C8086 DEVICE 02	C8086 DEVICE 04	C8685 DEVICE 06
	C0702	C0404	C0006	C0006	C0805
	SYNC MASTER	DOLBY DECODER	C8086 DEVICE 03	AC3 ENCODER	C8817 DEVICE 00
	C8830	C8601	C8086	C8612	C8817

PRESETS

DEVICE

SETUP / ROUTING

METADATA ENC 1

METADATA ENC 2

GPI/O

✖

AC3 Encoder

C8612

Dolby D / Dolby D+ Encoder

Encoder 1 (5.1)

Preset

Mode

DD (AC-3)

Metadata

Input Bus Status

Ch 1/2

Ch 3/4

Ch 5/6

Encoder 2 (2.0)

Preset

Mode

DD (AC-3)

Metadata

Input Bus Status

Ch 7/8

Ch 9/10

General

Data Rate

384 kbps

Channel Mode

3/2

LFE

☒

Bitstream Mode

C. Main

Original Bitstream

☒

Copyright

☐

Dynamic Range Control

Dialnorm

-31 dBFS

Profile Line Mode

None

Profile RF Mode

None

Filter

DC-High Pass

☒

Low Pass

☒

LFE Low Pass

☒

RF Overmod Protect

☐

Surround 3 dB Attenuation

☐

Surround Phase Shift

☐

Downmix

Nominal Center Mix Level

-3.0 dB

Nominal Surround Mix Level

-3.0 dB

Preferred Downmix Mode

Lo/Ro

Lo/Ro Center Mix Level

-3.0 dB

(Downmix to Stereo)

Lo/Ro Surround Mix Level

off dB

Lt/Rt Center Mix Level

-3.0 dB

(Downmix to Dolby ProLogic)

Lt/Rt Surround Mix Level

off dB

DE912 Web Configuration METADATA ENC 1 page

METADATA ENC 2 Page

The METADATA ENC 2 Page supports adjustment of metadata parameters if the Metadata Source for the encoder is set to Preset on the SETUP/ROUTING Page.

OVERVIEW

CONTROLLER
C8702

E DEC P1
C8501

LM P1
C8085

SDI I-O P1
C8404

AC 3 ENC P1
C8512

PRESETS

DEVICE

SETUP / ROUTING

METADATA ENC 1

METADATA ENC 2

GPI/O

AC 3 ENC P1

C8612

Dolby D / Dolby D+ Encoder

Encoder 1 (5.1)

Preset5-1

ModeDD (AC-3)

Metadata

Input Bus Status

Ch 1/2

Ch 3/4

Ch 5/6

Encoder 2 (2.0)

Preset

ModeDD (AC-3)

Metadata

Input Bus Status

Ch 7/8

Ch 9/10

DOLBY DIGITAL METADATA ENCODER 2

General

Data Rate384 kbps

Channel Mode2/0

Bitstream ModeC. Main

Original Bitstream

Copyright

Dynamic Range Control

Dialog Normalisation-31.0 dBFS

Profile Line ModeNone

Profile RF ModeNone

Filter

DC-High Pass

Low Pass

RF Overmod Protect

DE912 Web Configuration Metadata Enc 2 page

The table on the next page is an example for two programs. The Data Rate depends on the Channel Mode; some Channel Modes require a minimum Data Rate.

💡 A full explanation of the Dolby Metadata system is beyond the scope of this manual. We recommend studying the “Dolby Metadata Guide” and other publications available from Dolby (www.dolby.com).

Dolby Digital Metadata For DE912 Encoder

Parameter	Values – Program 1	Values – Program 2
General		
Channel Mode	1+1, 1/0, 2/0, 3/0, 2/1, 3/1, 2/2, 3/2	1+1, 1/0, 2/0
LFE	OFF, ON	N/A
Bit Stream Mode	C, Main, Mus Eff, Vis. Imp., H. Imp., Dialog, Comment, Emerg., Karaoke	C, Main, Mus Eff, Vis. Imp., H. Imp., Dialog, Comment, Emerg., Karaoke
Original Bit Stream	OFF, ON	OFF, ON
Copyright	OFF, ON	OFF, ON
Dynamic Range Control		
Dialog Normalization	-1 dBFS to -31 dBFS	-1 dBFS to -31 dBFS
Profile Line Modes	None, Film St., Film Lt., Mus. St., Mus. Lt., Speech	None, Film St., Film Lt., Mus. St., Mus. Lt., Speech
Profile RF Mode	None, Film St., Film Lt., Mus. St., Mus. Lt., Speech	None, Film St., Film Lt., Mus. St., Mus. Lt., Speech
Filter		
DC-Highpass	OFF, ON	OFF, ON
Low Pass	OFF, ON	OFF, ON
LFE Low Pass	OFF, ON	N/A
RF Overmod. Prot.	OFF, ON	OFF, ON
Surround -3dB	OFF, ON	N/A
Surround Phase Shift	OFF, ON	N/A
Downmix		
Nominal Center Mix Level	-3 dB, -4.5 dB, -6 dB	N/A
Nominal Surr. Mix Level	-3 dB, -6 dB, Off	N/A
Preferred Downmix Mode	Not indicated, Lt/Rt, Lo/Ro	N/A
Lo/Ro Center Mix Level	Off, -6 dB, -4.5 dB, -3 dB, -1.5 dB, 0 dB, 1.5 dB, 3 dB	N/A
Lo/Ro Surr. Mix Level	Off, -6 dB, -4.5 dB, -3 dB, -1.5 dB, 0 dB, 1.5 dB, 3 dB	N/A
Lt/Rt Center Mix Level	Off, -6 dB, -4.5 dB, -3 dB, -1.5 dB, 0 dB, 1.5 dB, 3 dB	N/A
Lt/Rt Surr. Mix Level	Off, -6 dB, -4.5 dB, -3 dB, -1.5 dB, 0 dB, 1.5 dB, 3 dB	N/A

GPIO Page

If a GPI input is detected by a GPIO module in the system, it puts an associated GPI number on the CAN bus. Each frame module monitors for these GPI numbers and performs the programmed action upon reading that number on the CAN bus.

OVERVIEW

CONTROLLER
C8702

E DEC P1
C8601

LM P1
C8086

SDI I-O P1
C8404

AC 3 ENC P1
C8612

PRESETS

DEVICE

SETUP / ROUTING

METADATA ENC 1

METADATA ENC 2

GPIO

AC 3 ENC P1

C8612

Dolby D / Dolby D+ Encoder

Encoder 1 (5.1)

Preset5-1

ModeDD (AC-3)

Metadata

Input Bus Status

Ch 1/2

Ch 3/4

Ch 5/6

Encoder 2 (2.0)

Preset

ModeDD (AC-3)

Metadata

Input Bus Status

Ch 7/8

Ch 9/10

GPI

Encoder 1

Preset 1OFF

Preset 2OFF

Preset 3OFF

Preset 4OFF

Preset 5OFF

Preset 6OFF

Preset 7OFF

Preset 8OFF

Encoder 2

Preset 9OFF

Preset 10OFF

Preset 11OFF

Preset 12OFF

Preset 13OFF

Preset 14OFF

Preset 15OFF

Preset 16OFF

GPO

Encoder 1

Preset 1OFF

Preset 2OFF

Preset 3OFF

Preset 4OFF

Preset 5OFF

Preset 6OFF

Preset 7OFF

Preset 8OFF

Metadata ErrorOFF

Encoder 2

Preset 9OFF

Preset 10OFF

Preset 11OFF

Preset 12OFF

Preset 13OFF

Preset 14OFF

Preset 15OFF

Preset 16OFF

Metadata ErrorOFF

DE912 Web Configuration GPIO page

GPI: PRESET 1–16

A GPI can be set to trigger a module Preset.

GPO: PRESET 1–16

A GPO can be set to trigger when a module Preset is recalled.

GPO: Metadata Error Encoder 1, Metadata Error Encoder 2

A GPO can be set to trigger when these conditions are detected.

 Do not assign the same GPIO numbers to different functions because this incorrectly triggers multiple functions.

Technical Specifications

External output

Connector	BNC
Impedance	75 Ω
Signal Level	1 Vpp
Standard	AES3, SMPTE 276M unbalanced
Data Format	16-, 20-, 24-bit
Sample Rate	48 kHz

Output audio formats

Dolby D (AC-3)	16-bit
Dolby D+ (AC-3/E)	16- or 32-bit
Latency	Dolby D: 91 ms Dolby D+: 112 ms

Metadata Input

Format	Standard Dolby metadata stream (RS485)
Baud Rate	115.2 kbps
Connector	D-Sub, 9-pin, male

General

Connector	75 Ω , BNC
Backplane Connector	DIN41612, 64-pin, a+b, male
Power Supply	+5 VDC
Power Consumption	~600 mA
Dimension	3 RU, 4 HP (1 slot)
Temperature	10–40°C
Humidity	90%, non-condensing

Appendix A: Compliance Information

Environmental Compliance

Disposal of Waste Equipment by Users in the European Union



This symbol on the product or its packaging indicates that this product must not be disposed of with other waste. Instead, it is your responsibility to dispose of your waste equipment by handing it over to a designated collection point for the recycling of waste electrical and electronic equipment. The separate collection and recycling of your waste equipment at the time of disposal will help conserve natural resources and ensure that it is recycled in a manner that protects human health and the environment. For more information about where you can drop off your waste equipment for recycling, please contact your local city recycling office or the dealer from whom you purchased the product.

Proposition 65 Warning

⚠ *This product contains chemicals, including lead, known to the State of California to cause cancer and birth defects or other reproductive harm. Wash hands after handling.*

Perchlorate Notice

This product may contain a lithium coin battery. The State of California requires the following disclosure statement: "Perchlorate Material – special handling may apply, See www.dtsc.ca.gov/hazardouswaste/perchlorate."

Recycling Notice



EMC (Electromagnetic Compliance)

Avid declares that this product complies with the following standards regulating emissions and immunity:

- FCC Part 15 Class A
- EN55103-1 E4
- EN55103-2 E4
- AS/NZS CISPR 22 Class A
- CISPR 22 Class A

FCC Compliance for United States

Communication Statement

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Any modifications to the unit, unless expressly approved by Avid, could void the user's authority to operate the equipment.

Australian Compliance



Canadian Compliance

This Class A digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la classe A respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

CE Compliance

(EMC and Safety)



Avid is authorized to apply the CE (Conformité Européenne) mark on this compliant equipment thereby declaring conformity to EMC Directive 2004/108/EC and Low Voltage Directive 2006/95/EC.

Safety Compliance

Safety Statement

This equipment has been tested to comply with USA and Canadian safety certification in accordance with the specifications of UL Standards: UL60950-1:2007, 2nd Ed and CAN/CSA C22.2 No. 60950-1-07, 2nd Ed. Avid Technology Inc., has been authorized to apply the appropriate NRTL mark on its compliant equipment.

Warning



Important Safety Instructions

- 1) Read these instructions.
- 2) Keep these instructions.
- 3) Heed all warnings.
- 4) Follow all instructions.
- 5) Do not use this equipment near water.
- 6) Clean only with dry cloth.
- 7) Do not block any ventilation openings. Install in accordance with the manufacturer's instructions.
- 8) Do not install near any heat sources such as radiators, heat registers, stoves, or other equipment (including amplifiers) that produce heat.
- 9) Do not defeat the safety purpose of the polarized or grounding-type plug. A polarized plug has two blades with one wider than the other. A grounding type plug has two blades and a third grounding prong. The wide blade or the third prong are provided for your safety. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.
- 10) Protect power cords from being walked on or pinched particularly at plugs, convenience receptacles, and the point where they exit from the equipment.
- 11) Only use attachments/accessories specified by the manufacturer.
- 12) For products that are not rack-mountable: Use only with a cart, stand, tripod, bracket, or table specified by the manufacturer, or sold with the equipment. When a cart is used, use caution when moving the cart/equipment combination to avoid injury from tip-over.

13) Unplug this equipment during lightning storms or when unused for long periods of time.

14) Refer all servicing to qualified service personnel. Servicing is required when the equipment has been damaged in any way, such as power-supply cord or plug is damaged, liquid has been spilled or objects have fallen into the equipment, the equipment has been exposed to rain or moisture, does not operate normally, or has been dropped.

15) For products that are a Mains powered device:

The equipment shall not be exposed to dripping or splashing and no objects filled with liquids (such as vases) shall be placed on the equipment.

Warning! To reduce the risk of fire or electric shock, do not expose this equipment to rain or moisture.

16) For products containing a lithium battery:

CAUTION! Danger of explosion if battery is incorrectly replaced. Replace only with the same or equivalent type.

17) For products with a power switch:

It should remain accessible after installation.

18) The equipment shall be used at a maximum ambient temperature of 40° C.

19) This unit is provided with a power supply cord set suitable for 120V AC input only (for U.S.A. and Canada). For other than U.S.A. and Canada, a qualified person must provide for use with this unit, an appropriate, approved power supply cord set which is in compliance with the end use country requirements and has a minimum cross-sectional area of 1.0mm².

20) For products with more than one power cord:

CAUTION: This unit has more than one power supply cord. Disconnect two power supply cords before servicing to avoid electrical shock.

ATTENTION: Cet appareil comporte plus d'un cordon d'alimentation. Afin de prévenir les chocs électriques, débrancher les deux cordons d'alimentation avant de faire le dépannage.

21) For products with an operator-accessible fuse:

CAUTION: For continued protection against risk of fire, replace only with same type and rating of fuse.

ATTENTION: Pour ne pas compromettre la protection contre les risques d'incendie, remplacer par un fusible de même type et de même caractéristiques nominales.



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Visit the Online Support Center at
www.avid.com/support

Product Information
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